Independent guide to the BBC MICRO!

THE MICRO USER

Volume 2
Number 11
January 1985
£1.25

After the holocaust

– Page 52

Mouse or Trak-ball? We tell how to harness both . . .

Basic I or II? – we give our verdict

Second processor – the vital I/O routines

Help Rover the retriever rescue his rations

4 great money-saving offers

SERIOUS SOFTWARE
FOR THE B.B.C. MICRO
From BEEBUGSOFT

SPELLCHECK II

NOW IN ROM and
up to 500% faster.

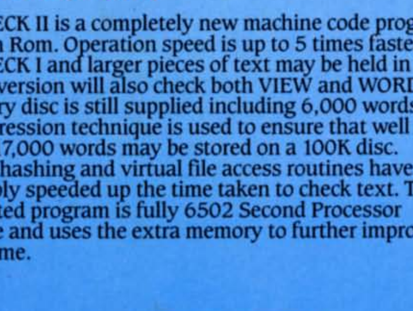
SPELLCHECK provides an automatic spelling check for letters or documents and is the ideal companion to WORDWISE or VIEW. It is menu driven, easy to use and allows unknown words to be added to the dictionary, ignored or re-spelt. A new corrected copy of the text may then be saved to disc.

SPELLCHECK I (On Disc)

SPELLCHECK I is supplied on two discs with a starting dictionary of 6,000 words. Separate versions are available for WORDWISE and VIEW. (When ordering please specify).

SPELLCHECK II (On Rom)

SPELLCHECK II is a completely new machine code program supplied in Rom. Operation speed is up to 5 times faster than SPELLCHECK I and larger pieces of text may be held in memory. The same version will also check both VIEW and WORDWISE. A dictionary disc is still supplied including 6,000 words, but a data compression technique is used to ensure that well in excess of 17,000 words may be stored on a 100K disc. Ingenious hashing and virtual file access routines have also considerably speeded up the time taken to check text. This sophisticated program is fully 6502 Second Processor compatible and uses the extra memory to further improve word retrieval time.



```
  SPELLCHECK II  from  Beebugsoft
TEXT DRIVE 0        DICTIONARY DRIVE 0
                VIEW
Your Options Are

         A ... Automatic Check
         B ... Attended  Check

         D ... Select Drive
         Q ... Quit Spellcheck

         L ... Load Text
         S ... Save Text

Select Option


Text file  LETT01
```

HELP ROM

What is the second parameter...?

How do I turn the cursor off?

Is it FX3 or 4 that...?

Do I need a comma or semi-colon in the PRINT statement?

What logical colour is red?

?

Give your micro a mainframe utility

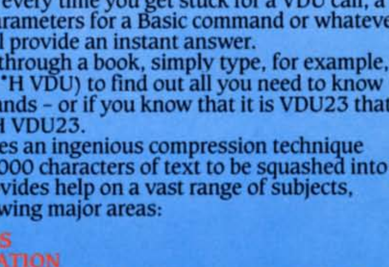
Most large mainframe computers have a comprehensive on-screen HELP facility to aid programming, save time and help you out when you get stuck. BEEBUGSOFT's new HELP Rom will give your micro a similar facility.

Just plug it in, and every time you get stuck for a VDU call, a colour code, the parameters for a Basic command or whatever: the HELP Rom will provide an instant answer.

Rather than wade through a book, simply type, for example, *HLP VDU (or just *H VDU) to find out all you need to know about VDU commands – or if you know that it is VDU23 that you want – type *H VDU23.

The HELP Rom uses an ingenious compression technique enabling some 14,000 characters of text to be squashed into an 8K eprom, and provides help on a vast range of subjects, including the following major areas:

BASIC KEYWORDS
MEMORY ALLOCATION
SCREEN MODES
SOUND
COLOUR
TELETEXT
VDU
COMMANDS
FX CALLS



```
>*HLP VDU
 VDU

 Sends character to VDU queue

 For specific help use *HLP VDU n

 0  Nothing
 1  Next char to printer only
 2  Enable printer
 3  Disable printer
 4  Separate cursors
 5  Join cursors
 6  Enable VDU drivers
 7  Bell
 8  Cursor left
 9  Cursor right
 10 Cursor down
 11 Cursor up
 12 Clear text screen
 13 Cursor to start of line
 14 Paged mode on
 15 Paged mode off

>
```

HELP will not
affect the normal
*HELP command

BEEBUG SOFT

SPELLCHECK II **£31** HELP ROM **£25**

SPELLCHECK I **£19**

Available from your local dealer and selected branches of W.H. SMITH'S

Prices include VAT

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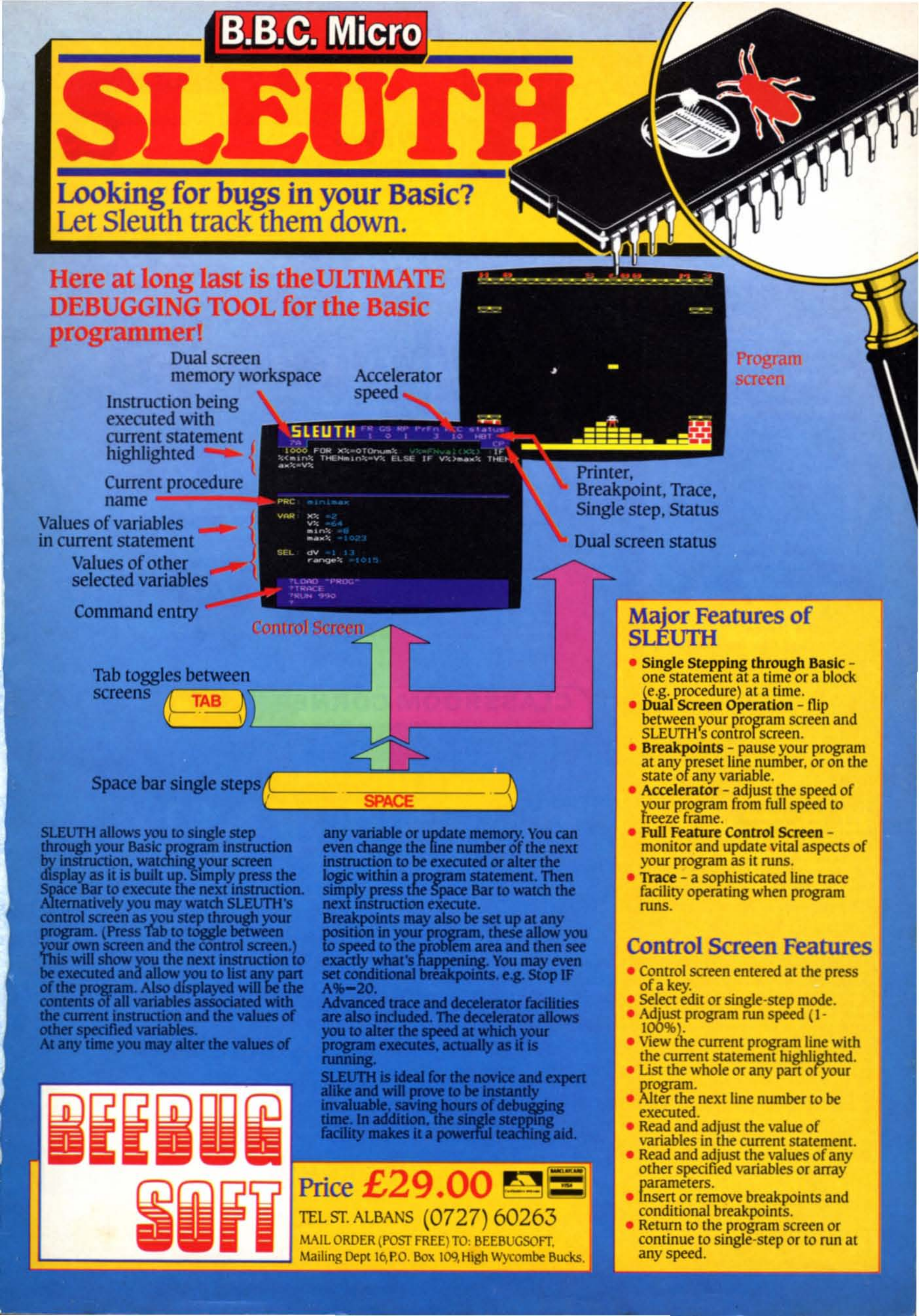

B.B.C. Micro

SLEUTH

Looking for bugs in your Basic?
Let Sleuth track them down.

Here at long last is the ULTIMATE DEBUGGING TOOL for the Basic programmer!

Dual screen memory workspace
Accelerator speed
Instruction being executed with current statement highlighted
Current procedure name
Values of variables in current statement
Values of other selected variables
Command entry
Control Screen
Program screen
Printer, Breakpoint, Trace, Single step, Status
Dual screen status
Tab toggles between screens
TAB
Space bar single steps
SPACE

```
SLEUTH FR GS RP PrFn  C status
        1  0  1    3 10  HBT
7A                         CP
 1000 FOR X%=0TOnum%  V%=FNval(X%)  IF
%<min% THENmin%=V% ELSE IF V%>max% THE
ax%=V%

PRC: minimax

VAR: X% =2
     V% =64
     min% =8
     max% =1023

SEL: dV =1.13
     range% =1015

?LOAD "PROG"
?TRACE
?RUN 990
?
```

SLEUTH allows you to single step through your Basic program instruction by instruction, watching your screen display as it is built up. Simply press the Space Bar to execute the next instruction. Alternatively you may watch SLEUTH's control screen as you step through your program. (Press Tab to toggle between your own screen and the control screen.) This will show you the next instruction to be executed and allow you to list any part of the program. Also displayed will be the contents of all variables associated with the current instruction and the values of other specified variables.

At any time you may alter the values of any variable or update memory. You can even change the line number of the next instruction to be executed or alter the logic within a program statement. Then simply press the Space Bar to watch the next instruction execute.

Breakpoints may also be set up at any position in your program, these allow you to speed to the problem area and then see exactly what's happening. You may even set conditional breakpoints, e.g. Stop IF A%=20.

Advanced trace and decelerator facilities are also included. The decelerator allows you to alter the speed at which your program executes, actually as it is running.

SLEUTH is ideal for the novice and expert alike and will prove to be instantly invaluable, saving hours of debugging time. In addition, the single stepping facility makes it a powerful teaching aid.

Major Features of SLEUTH

- **Single Stepping through Basic** - one statement at a time or a block (e.g. procedure) at a time.
- **Dual Screen Operation** - flip between your program screen and SLEUTH's control screen.
- **Breakpoints** - pause your program at any preset line number, or on the state of any variable.
- **Accelerator** - adjust the speed of your program from full speed to freeze frame.
- **Full Feature Control Screen** - monitor and update vital aspects of your program as it runs.
- **Trace** - a sophisticated line trace facility operating when program runs.

Control Screen Features

- Control screen entered at the press of a key.
- Select edit or single-step mode.
- Adjust program run speed (1-100%).
- View the current program line with the current statement highlighted.
- List the whole or any part of your program.
- Alter the next line number to be executed.
- Read and adjust the value of variables in the current statement.
- Read and adjust the values of any other specified variables or array parameters.
- Insert or remove breakpoints and conditional breakpoints.
- Return to the program screen or continue to single-step or to run at any speed.

BEEBUG SOFT

Price **£29.00**

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THE MICRO USER
After the holocaust

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Features Editor
Mike Bibby
Production Editor
Peter Glover
Layout Design
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Mike Cowley
Technical Editor
Mike Cook
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Margaret Clarke
Editor in Chief, Database Publications
Peter Brameld

Tel: 061-456 8835 (Editorial)
061-456 8383 (Administration)
061-456 8500 (Advertising)
061-480 0171 (Subscriptions)
Telex: 667664 SHARET G
Prestel Mailbox: 614568383

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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- ★ Upgrade from Basic I to Basic II and take advantage of its extra facilities.
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- ★ **Make full use of the tremendous graphics power of your BBC Micro with the AMX mouse.**
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- ★ **Interface an Atari Trak-ball to your BBC Micro and gain fingertip control of your programs.**
  See Page 194

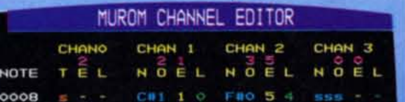
SERIOUS SOFTWARE
FOR THE B.B.C. MICRO AND ELECTRON
From BEEBUGSOFT

B.B.C. only

MUROM

The BBC Micro sound facilities have a lot of potential, MUROM will help you exploit this to the full.

Create your own tunes and sound sequences with ease, either with MUROM'S editor and a musical score or by using the Beeb to simulate a piano keyboard. Edit your creations with the full screen music editor. Then switch to the envelope editor to tailor the tonal quality and select instrument type. Alternatively select one of the predefined instrument envelopes.



```
           MUROM CHANNEL EDITOR

       CHAN0    CHAN 1     CHAN 2     CHAN 3
         2        2 1        3 5        0 0
NOTE   T E L   N O E L    N O E L    N O E L

0008   s - -   C#1 1 0    F#0 5 4    sss - -
0009   s - -   D#1 1 0    www - -    sss - -
0010   s - -   E 1 1 1    www - -    sss - -
0011   s - -   www - -    www - -    sss - -
0012   s - -   A#1 1 0    www - -    sss - -
0013   s - -   B 1 1 0    www - -    sss - -
0014   s - -   D#1 1 0    D#3 5 1    sss - -
0015   s - -   D#2 1 0    www - -    sss - -
0016   s - -   F 2 1 1    sss - -    sss - -
0017   s - -   sss - -    sss - -    sss - -
0018   s - -   sss - -    sss - -    sss - -
0019   s - -   sss - -    sss - -    sss - -
0020   s - -   sss - -    sss - -    sss - -
0021   s - -   sss - -    sss - -    sss - -
0022   s - -   sss - -    sss - -    sss - -
0023   s - -   sss - -    sss - -    sss - -
0024   s - -   sss - -    sss - -    sss - -
0025   s - -   sss - -    sss - -    sss - -
```

Incorporate your music and sound sequences into any program of your own, to play back with or without MUROM plugged in. Playback is interrupt driven and may continue even while you run other programs.

Predefined instrument envelopes may be set up, e.g. *FLUTE, *SYNTH etc.

Instant sound effects may be called from Basic, e.g. *ZAP, *SIREN, *EXPLODE etc.

MUROM is accompanied by a full instruction manual and repertoire of music data on cassette.

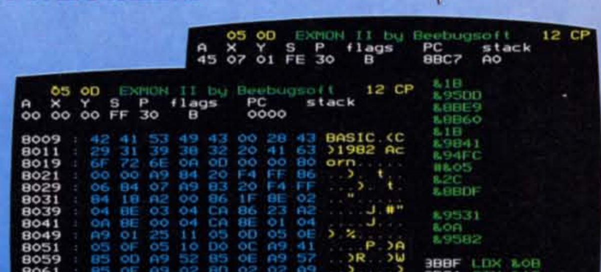
COMMAND SUMMARY

***PLAY**	Calls the variable speed, interrupt driven playback routine.
***DISP**	Mode 7 display of tune playing.
***TEMPO**	Alter tempo.
***KEYB**	Use BBC keyboard as a piano keyboard.
***SCORE**	Call up full screen music editor.
EDITOR SUB-COMMANDS:	
MODE	Change from editing a single channel to editing all channels consecutively.
GO	Move editor to any note in score.
PLAY	Enable single stepping of music.
OCTV	Change octave of any channel.
ENVL	Change envelope of any channel.
LOAD	Load previously created music.
SAVE	Save edited score to disc or cassette.
KEY	Toggle note entry between note name and keyboard position.
***ENVLP**	Sound envelope editor.
***FLUTE,**	*SYNTH . . . etc. ten predefined envelopes.
***EXPLODE,**	*ZAP . . . etc. ten predefined effects.
***TRANS**	Transpose up or down by a number of semitones.
***MONOC**	Disable colour output for monochrome screens.

B.B.C. & Electron

EXMON II

EXTENDED MACHINE CODE MONITOR NOW WITH DUAL SCREENS



```
                    05 0D  EXMON II by Beebugsoft    12 CP
                    A  X  Y  S  P  flags    PC    stack
                    45 07 01 FE 30   B      8BC7   A0

   05 0D  EXMON II by Beebugsoft    12 CP    &1B
A  X  Y  S  P  flags    PC     stack         &95DD
00 00 00 FF 30   B      0000                 &8BE9
                                             &8B60
8009 : 42 41 53 49 43 00 28 43 BASIC.(C      &1B
8011 : 29 31 39 38 32 20 41 63 )1982 Ac      &9841
8019 : 6F 72 6E 0A 0D 00 00 80 orn.....      &94FC
8021 : 00 00 A9 84 20 F4 FF 86 ..). t..      #&05
8029 : 06 B4 07 A9 83 20 F4 FF ...). t.      &2C
8031 : 84 18 A2 00 86 1F 8E 02 ..".....      &8BDF
8039 : 04 8E 03 04 CA 86 23 A2 ....J.#"
8041 : 0A 8E 00 04 CA 8E 01 04 ....J...      &9531
8049 : A9 01 25 11 05 0D 05 0E ).%.....      &0A
8051 : 05 0F 05 10 D0 0C A9 41 ....P.)A      &9582
8059 : 85 0D A9 52 85 0E A9 57 ..)R..)W
8061 : 85 0F A9 02 8D 02 02 A9 ..).....)    8BBF LDX &0B
8069 : B4 8D 03 02 58 4C DD 8A 4...XL→.     8BC1 STX &19
8071 : 41 4E 44 80 00 41 42 53 AND..ABS     8BC3 LDX &0C
                                             8BC5 STX &1A
                                             8BC7 STY &1B
?P 8000
?SS 8000→9000"BASIC"
 Found at 8009
```

60 New Commands for debugging and developing machine code

Our very popular machine code monitor has been enhanced by the addition of a number of new facilities, including Dual Screen Operation and full screen memory editor.

Now if you are debugging a game, or any other program with a visual display, you can single step through it instruction by instruction and actually watch the effect on the screen.

You can also revert to the monitor screen at the press of a key to examine registers, edit code, read variables, alter memory etc., and then switch back to your display screen and continue running (or single stepping), without losing your display.

Exmon II features include

- 60 machine code commands.
- Full dual screen operation.
- Full screen memory editor, input in hex, Ascii or as assembler instructions.
- Search for hex, or Ascii string, including wildcards.
- Move memory block.
- Verify that two blocks are the same.
- Relocate code to run at another location.
- Fill memory with series of hex bytes or Ascii string.
- Execute all * commands.
- Single step with skip option.
- Up to 10 breakpoints which may even be set in Rom.
- Conditional breakpoints . . . e.g. Break if register X=5.
- User definable work area.

Note: The Electron version does not feature dual screens.

BEEBUG SOFT

MUROM **£29.00** EXMON II **£29.00**

Available from your local dealer and selected branches of W.H. SMITH'S

Prices include VAT

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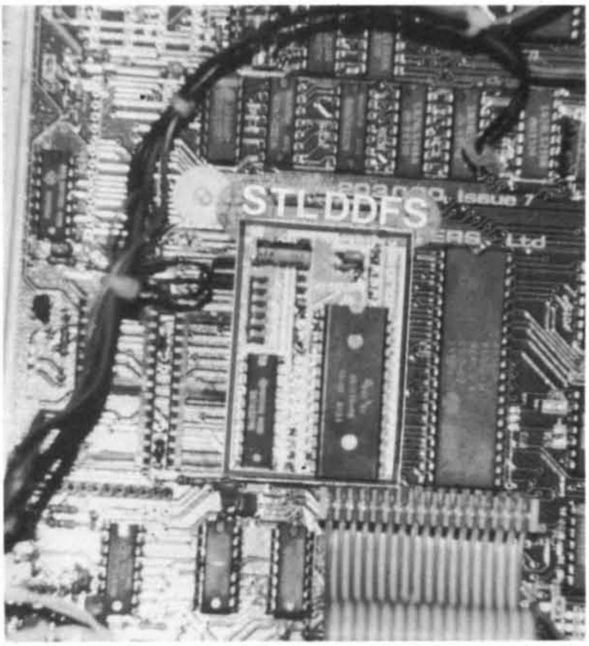
FROM SMALL ACORNS, SOLIDISK GROWS.

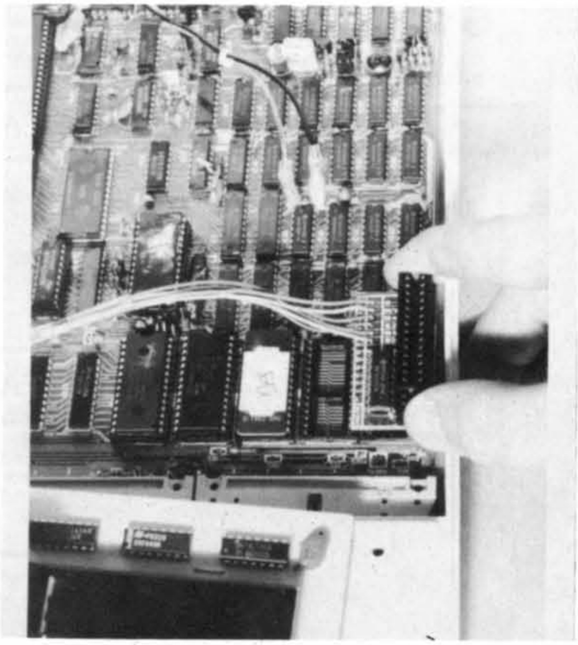
IN JULY 1983, we released the Sideways RAM for the BBC computer. We sold 5 in the first week, 10 in the second week, 20 in the third and one year later, we sell more than 500 in the UK and well more than 100 a week abroad.

By the time you read this, more than 30,000 Solidisk Sideways RAM boards will be beavering away in hundreds of schools and thousands of homes.

They are being joined by thousands of Solidisk DDFS each month. Soon, we hope, they will all be linked together by Solidisk Single Chip MODEM.

To support the users, a network of Solidisk Local Experts, covering the UK, Holland, France, Australia and Israel has been set up and expanding. Providing fitting and software for free.





SOLIDISK DOUBLE DENSITY DFS 1.5:
Single and Double Density.
Automatic Density Selection.
1 or Twin Drives, 40 and 80 Tracks, Single and Double Sided.
Automatic 40 and 80 Track Selection.
31 Filenames.
Low Cost.

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Virtually Unlimited Number of Filenames.
Automatic Tape to Disk.
Built-in Disk Fix and Disk Sector Editor.
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Does not Require DNFS With Z80 and 6502 Second Processors.

SOLIDISK SIDEWAYS RAM:
Add from 16k to 256k bytes of RAM to the BBC 32k RAM.
Useable for running Sideways ROM Software.
Useable in Networks or on BBC with Disk Drive(s).
Compatible With All Acorn Existing Products.
Including Econet, Teletext, 6502 and Z80 Second Processors.
Compatible With Most Sideways ROM Software.
Available Multi User Licencing Agreement from Leading Software Houses.
Easily Expandable as Your Needs Grow.
Low Cost.
Free Installation if Required.
Very large User Base, Extensive Free Software.
Local Help by Solidisk Local Expert Network.
Free Membership to receive Periodic Newsletters.

COMING SOON:
SOLIDISK is at present developing a state of the art MODEM. This will be compatible with the CCITT V23 and BELL 202 transmission standards at speeds from 5 to 1200 Bauds and will be based on the TMS 3105 single chip FSK MODEM manufactured by TEXAS Instruments.
The price is expected to be £39.95 inclusive of VAT.

We need you and your help. To make Solidisk Users the largest BBC Users Group. To share good ideas and good ways to use them.

SOLIDISK TECHNOLOGY, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX
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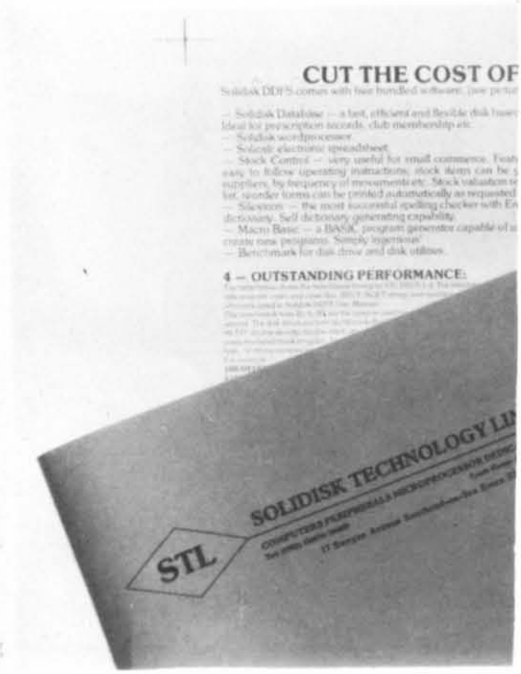
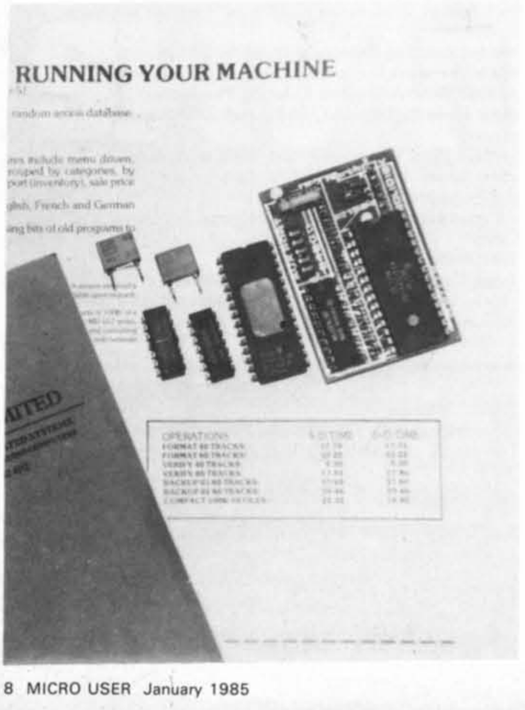
HAVE YOU ALREADY GOT DISK DRIVE(S) FOR YOUR BBC COMPUTER?

OPERATIONS	S/D TIME	D/D TIME
FORMAT 40 TRACKS:	**17.74**	**17.74**
FORMAT 80 TRACKS:	**33.22**	**33.22**
VERIFY 40 TRACKS:	**9.30**	**9.30**
VERIFY 80 TRACKS:	**17.84**	**17.84**
BACKUP 01 80 TRACKS:	**37.69**	**37.69**
BACKUP 02 80 TRACKS:	**39.46**	**39.46**
COMPACT 100K-10 FILES	**22.42**	**18.82**





THE SOLIDISK DOUBLE DENSITY DFS

If you take your Disk Systems seriously then there are very few viable alternatives to our new Double Density Filing System.

Anyone, with their ear to the ground, will probably have heard of the great shortage of the 8271 Floppy Disk Controller chip. This chip is, of course, the basis of all single density DFS upgrades for the BBC Microcomputer and is used extensively by Acorn, AMCOM and Watford Electronics in their respective DFS's.

This shortage can mean long delays or paying much inflated prices to obtain your Disk Upgrade.

Now, however, we at SOLIDISK have developed an alternative system with many advantages over the 8271 based upgrades. Not the least of these being continuation of supply of the FDC chip (Western Digital 1770) but, also, improvements in the speed and versatility of operation.

EASY TO INSTALL

The SOLIDISK DDFS comes complete with an easy to follow manual with step by step installation instructions, and can be fitted in just a few minutes by anyone with just the barest knowledge of the insides of their BBC.

The DFS contains just 4 IC's and 2 jumpers to be inserted and one link to be cut in the computer. This is compared to the usual upgrades which require 11 IC's to be fitted and the link to be cut.

EASY TO USE

The SOLIDISK DDFS Revision 1.5 contains many time and labour saving features. These include formatter, verifier, automatic density sensing, automatic 40/80 track switching and Single/Double Density mass copying etc.

COMPLETE CONTROL OVER THE DISK

SOLIDISK DDFS gives you complete control over your disk drive(s). You can use any combination of Single/Double Density, 40 or 80 tracks in one or two disk drives.

Every time the SOLIDISK DDFS accesses the disk it detects the density and the disc size in use and acts accordingly.
You can for example copy from a 40 to an 80 track disc on the same 80 track disk drive or even format a 40 track disk in an 80 track drive using the automatic disc size sensing in the DDFS. It is also possible to have one side of a disc formatted in Single Density and the other side in Double Density. Also copying between different densities is coped with automatically and, when using twin drives, is very fast.

GREATER DISC CAPACITY

When formatting a disk with the SOLIDISK DDFS you have a choice of the usual Single Density or the increased capacity Double Density.

Formatting in Single Density will leave your disk compatible with all other Single Density systems. However if the disk is formatted in Double Density it will have a 60% greater capacity than the equivalent size Single Density disk. This means that on an 80 track disk that the capacity is increased from the usual 400 kbytes to 640 kbytes of storage. The Double Density Format used is, at present, unique to the SOLIDISK DDFS and provides 16 sectors per track as opposed to the usual 10 sectors in Single Density giving a 40% saving in media surface for a file of given length over Single Density.

INCREASED SPEED OF OPERATION

As mentioned previously a disk formatted in Double Density uses about 40% less disk space per given length of file than does a disk formatted in Single Density or alternatively it holds 60% more information per track. This allows the, already fast, SOLIDISK DDFS to run very fast in the Double Density mode as demonstrated in the benchmark test on the next page.

BENCHMARK OUTSTANDING PERFORMANCE:

The table below shows the benchmark timing for STL DDFS 1.4. The benchmark consists of disk operations such as save and load a 16k program, open and close files, BPUT, BGET strings and numbers, format and verify a disk etc., and is available upon request, otherwise listed in Solidisk DDFS User Manual.

The benchmark tests B1 to B9 are the same as used by many reviewers. The time is expressed in seconds and parts of 100th of a second. The disk drives are twin 40/80 track double sided MITSUBISHI M4853, the diskettes are Verbatim Datalife MD 557 series, 96 TPI, double density, double sided, preverified to ensure that the media is free of all error and mechanical defects and containing solely the benchmark program. The test is loaded into memory, the drive motors are allowed to stop completely 2 seconds between tests, 10 timing samples are taken and the mean time is calculated automatically.
For example:

```
100 DEFFNb1:REM Save a 16k program.
110T% ÷ TIME
120 *SAVE A 8000 +4000
130 ÷ TIME — T%
```

Full listings are included in the User Manual.
This FN is called 10 times with 3 sec. interval, the mean result is printed as 'B1'.

BENCHMARK DESCRIPTION	S/D TIME	D/D TIME
B1 Save 16k	2.62	1.43
B2 Load 16k	2.45	1.23
B3 Openin and close 100 times	20.70	20.16
B4 Openout and print 1000 numbers (255)	5.84	4.66
B5 Openin and input 1000 numbers (255)	4.72	4.14
B6 Openout and print 100 80 bytes strings	6.18	4.91
B7 Openin and input 100 80 bytes strings	4.90	4.31
B8 BPUT 100 bytes (255)	3.01	2.06
B9 BGET 1000 bytes (255)	1.88	1.52

Note 1: Whenever a file is to be opened, STL DDFS automatically refreshes the disk directory, thus preventing erroneous disk change. Many other DFS's do not take the same care, although yielding a much shorter time, and this could accidentally stop the program.

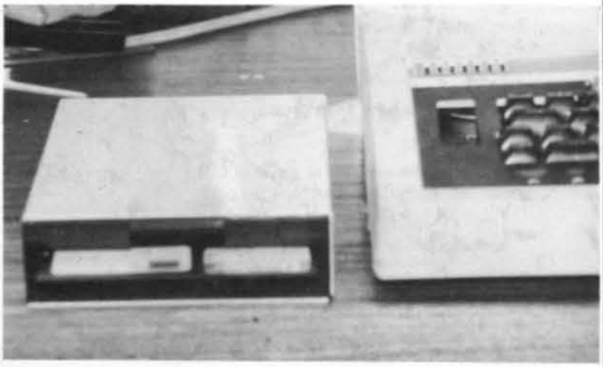
OPERATIONS	S/D TIME	D/D TIME
FORMAT 40 TRACKS:	17.74	17.74
FORMAT 80 TRACKS:	33.22	33.22
VERIFY 40 TRACKS:	9.30	9.30
VERIFY 80 TRACKS:	17.84	17.84
BACKUP 01 80 TRACKS:	37.69	37.69
BACKUP 02 80 TRACKS:	39.46	39.46
COMPACT 100K 10 FILES	22.42	18.82

With Wordwise:
Load 2000 words (17811 bytes) 16.80 sec. (41.40 sec. with AC).
With Scribe:
Count 2000 words (17811 bytes) 4.20 sec. (9.80 sec. with AC.90 DFS)
With Beebug's Masterfile:
Sort records 1 to 20 in PEOPLE sample database, the database is presorted on field 2 then the program is asked to sort on field 1, the time is then taken: 56.23 sec. (127.86 sec. with AC.90 DFS).
These timings are improved even further in double density mode.

The figures speak for themselves.

STL DDFS dramatically increases the operating speed of your software, including wordprocessors like Wordwise, View, Scribe, databases like Masterfile, Starbase etc.

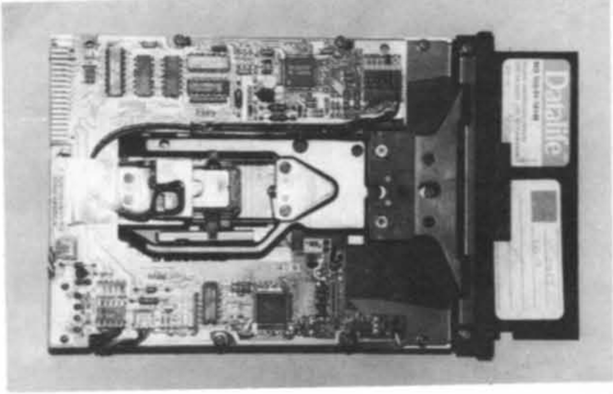
Solidisk engineers won't stop there.



MITSUBISHI DISK DRIVE:
From the new VLSI ultra quiet auto spin-up series comes the MITSUBISHI M4853. We have chosen it for its speed, quiet performance, low power consumption and state of the art design — look at the following features:
— new developments by Motorola and Mitsubishi largely reduce the area taken up by electronics, leaving more room for the diskette. This in turn implies lower noise levels and reduced friction on diskettes.

8 Slim 5.25" half height model attractively cased in BBC micro beige
— Reliability; we find that Mitsubishi compares most favourably with other makes
— Use your BBC own power supply —
— Single and double density available, plus ability ro read 40 track diskettes formatted elsewhere when used with our DFS.

Of course, we don't need to mention that all drives come complete with Dual leadds letting you add instantly a second disk drive and manual together with full guarantee on parts and labour.



EXTRA FEATURES OF SOLIDISK DDFS 2.0

With the production of the SOLIDISK DDFS 2.0 ROM we raise the already high standard of the previous DDFS 1.5 ROM.

The larger memory capacity of the DDFS 2.0 has allowed inclusion of a Wordprocessor and complete Disk Toolkit as well as a totally new concept in the working of the Disk Directory.

This will, we feel, make the SOLIDISK DDFS 2.0 ROM the most powerful Disk System currently available.

1) EXTENDED NUMBER OF FILENAMES

The standard number of filenames on the BBC microcomputer is limited to 31on most Single Density DFS's. This usually presents no problem on a system using 40 track drives but when using either 80 track drives and/or a Double Density Filing System this number will quite often be reached with a lot of the disk space still unused.

The SOLIDISK DDFS 2.0 ROM uses a unique and novel way to circumvent this shortcoming as every time a catalogue becomes full a new one is created. This gives the possibility of having up to 1502 filenames on a normal 80 Track Double Sided disk. Even with this large number of filenames worst case access taking only just over 2 seconds. Obviously with large files and a lesser number of filenames the access time decreases dramatically.

The way that the DDFS 2.0 ROM operates means that ordinary single catalogue discs are completely compatible with our system and, indeed, will be upgraded to multi catalogue once the number of filenames exceeds 31. This means no special formatting is necessary and that the disc remains compatible with other Single Density DFS's.

2) DISK TOOLKIT

Included on the SOLIDISK DDFS 2.0 ROM is a powerful disk repair facility. It is possible to read a complete track into memory and to repair or modify the data before restoring the track to the disk. If only one sector needs to be worked on then this too is possible with the Disk Sector Editor contained in the DDFS 2.0.

A powerful Disk Copy routine is also included to allow mmost non-standard format disks to be duplicated. This routine will also displaay the Sector I.D. Fields so that it is possible to see the makeup of the track being copied.

3) WORDPROCESSOR:

SOLIDISK DDFS 2.0 ROM contains a Word Processor with many excellent features such as 80 column screen, automatic on screen justification, Search and Replace, Block Move and Copy etc.

SOLIDISK+MITSUBISHI BIG DEAL:

This is exactly what you would receive:

— one double sided 80 track Mitsubishi M4853 disk drive, cased in beige.
— one Solidisk Double density disk interface (complete with STL DDFS 1.5 ROM) as described overleaf, giving a total capacity of 640K.
— Dual leads and instruction manual.
— 5 Software Diskettes containing a selection of the most prestigious programs written for the BBC.
— full one year guarantee.
—all for £209.95 including VAT and post and packing.

THE HARDWARE:
As described earlier and opposite.

THE SOFTWARE:
A selection of 6 programs based on ease of use, and popularity. All efforts are made so that you would not have to read the manual twice.
All programs feature on screen help (word processor) or option menus throughout. Mode 3 is used throughout whenever possible for good visual representation.

— Solicalc —
A Disc Based electronic spreadsheet made only possible with the speed of Solidisk DDFS. The sheet size can be as big as 170 kbytes. Written in modules, it is easily upgradable. Mode 3 screen. Goto, Calculate, Replicate, Automatic Header etc.

— Solidisk Datafile —
A fast, efficient and random access Database. Solidisk Datafile features:
— Compact size.
— 80 column screen throughout.
— 15 fields of 60 characters per card.
— Unlimited number of cards.
— Powerful Screen Editing allowing VERY FAST data entry on new cards or data correction on old cards.
— All Maths functions on ALL fields admitting Symbolic Variables (like A, B, C, D etc) for entering formulae.
— Special SORT program making use of any free disk space to avoid swapping cards.
— Standard options include View, Print using Tabulation, Print Labels, Search on any number of criteria and repeat on count, Amend, Create, Spool to disk, Append and Mailmerge with Solidisk Word Processor (requires EPSON compatible printer).
— Ability to read BEEBUG's Masterfile and possibly other systems later on.

— Solidisk wordprocessor —
On screen help, Wordstar style cursor editing and control keys, on screen justification while you type, Block commands, Quick commands and dot commands for mailmerge. Future development will allow reading Wordstar text from the Z80 second processor. Solidisk can offer Laser Typesetting and Page Planning service: it costs you only £1.00 for typesetting 1×A4 page (around 4,000 characters) from disk received by MODEM.

— Stock control —
useful for small businesses. Features include menu driven, easy to follow instructions, easy categorising. Stock evaluation reports and inventories, together with price lists and reorder forms can be printed automatically as requested.

— Silexicon — the most successful spelling checker with English, French and German dictionaries, together with self generating capability.

— Macrobasic —
a BASIC program generator capable of using bits of old programs to create new ones. Clever ideas — clever ideas of making them work!

Please note that this software is only free as prt of the package deal. It is otherwise avaiable at a cost of £14. Customers who would prefer the DFDC version of our disk filing system (see earlier) can purchase the package deal with this option for an extra £10.
What we may need to tell you is that the price is also agreeably low — check what we offer against any of our competitors — which all adds up to a high degree of sophistication affordable to students and businessmen alike.

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The DFDC board simply sits in place of the 8271 FDC, this being reinstalled in the DFDC boaard. Now all that needs to be done is to install the DDFS ROM into a Rom Socket, to the right of the existing Acorn DFS, and two other minor connections.

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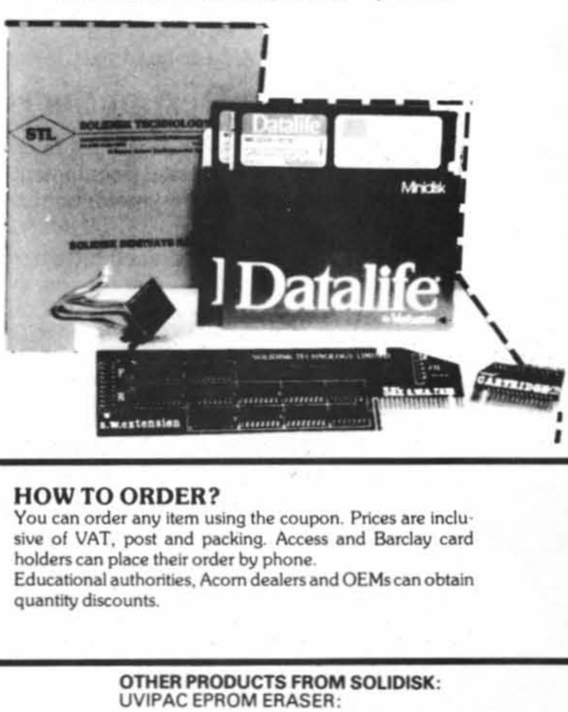


HOW TO ORDER?

You can order any item using the coupon. Prices are inclusive of VAT, post and packing. Access and Barclay card holders can place their order by phone.
Educational authorities, Acorn dealers and OEMs can obtain quantity discounts.

OTHER PRODUCTS FROM SOLIDISK:
UVIPAC EPROM ERASER:

Herbie Briggs has just destroyed the myth that all floppy discs are created equal.

They seem equal. Until you look at the seams.

That's where equality ends.

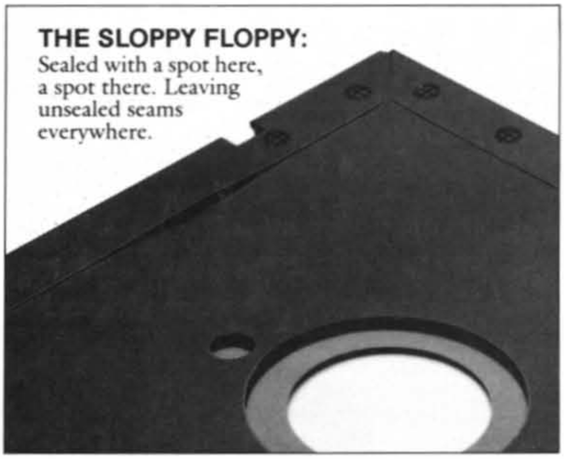
Most companies seal their discs with a spot here, a spot there. Leaving most of each seam not sealed at all.

Sooner or later, the seams might do what comes naturally: they bulge. Warp. Pucker. Open up.

Pens, pencils, fingernails—even a four-year-old's, like Herbie—can catch and snag in those wide open spaces.

That's sloppy. And dangerous. Because if you put a sloppy floppy into your disc drive, it can jam your drive. Ruin your drive head. Lose your data.

So much for their seams. Ours are different.



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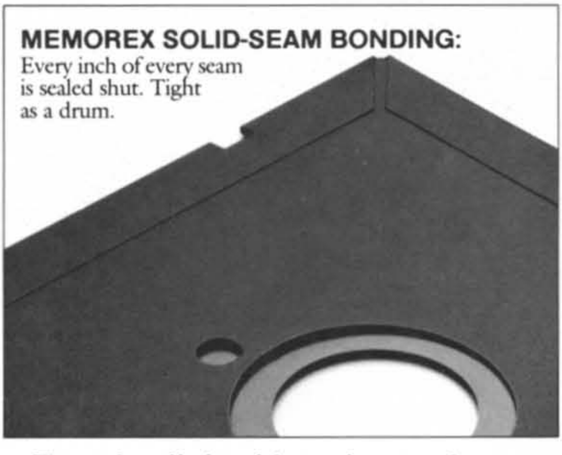

MEMOREX SOLID-SEAM BONDING:
Every inch of every seam is sealed shut. Tight as a drum.

To resist all the things that can jam your drive, ruin your drive head, or lose your data.

Which proves that a Memorex floppy disc isn't equal to all the others. It's better.

Solid-Seam Bonding is just one example of the extra care that goes into every Memorex floppy disc. Be it 8," 5¼" or the new 3½." Extra care that lets us guarantee every Memorex disc to be 100% error-free.

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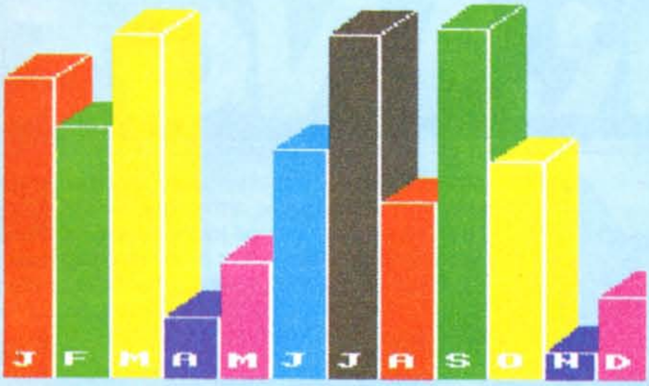

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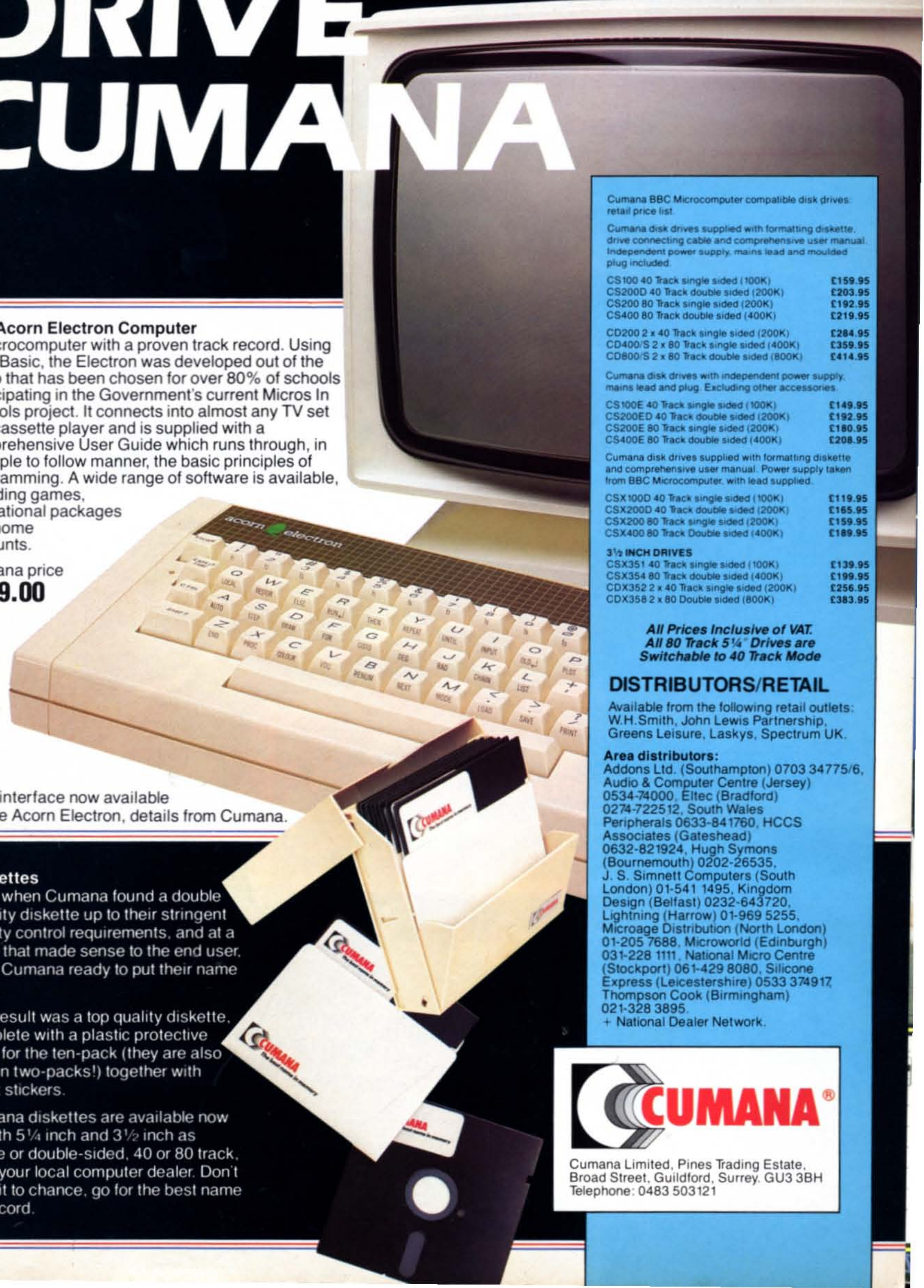

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A microcomputer with a proven track record. Using BBC Basic, the Electron was developed out of the Micro that has been chosen for over 80% of schools participating in the Government's current Micros In Schools project. It connects into almost any TV set and cassette player and is supplied with a comprehensive User Guide which runs through, in a simple to follow manner, the basic principles of programming. A wide range of software is available, including games, educational packages and home accounts.

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Disk interface now available for the Acorn Electron, details from Cumana.

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Cumana diskettes are available now in both 5¼ inch and 3½ inch as single or double-sided, 40 or 80 track, from your local computer dealer. Don't trust it to chance, go for the best name on record.

Cumana BBC Microcomputer compatible disk drives: retail price list.

Cumana disk drives supplied with formatting diskette, drive connecting cable and comprehensive user manual. Independent power supply, mains lead and moulded plug included.

CS100 40 Track single sided (100K)	£159.95
CS200D 40 Track double sided (200K)	£203.95
CS200 80 Track single sided (200K)	£192.95
CS400 80 Track double sided (400K)	£219.95
CD200 2 x 40 Track single sided (200K)	£284.95
CD400/S 2 x 80 Track single sided (400K)	£359.95
CD800/S 2 x 80 Track double sided (800K)	£414.95

Cumana disk drives with independent power supply, mains lead and plug. Excluding other accessories.

CS100E 40 Track single sided (100K)	£149.95
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CSX400 80 Track Double sided (400K)	£189.95

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All 80 Track 5¼" Drives are Switchable to 40 Track Mode

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NIGHTINGALE - The Modem

NIGHTINGALE
MULTI FUNCTION MODEM
PACE
APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.
S/2592/3/E/500065

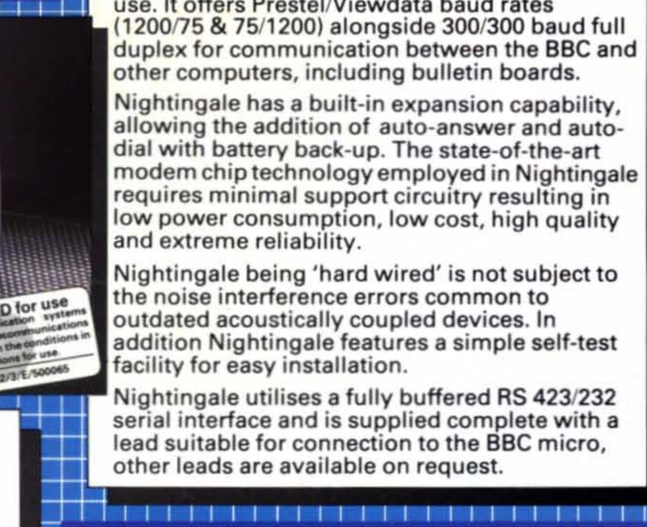
Nightingale is by far the most versatile modem available, at the price, for either home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) alongside 300/300 baud full duplex for communication between the BBC and other computers, including bulletin boards.

Nightingale has a built-in expansion capability, allowing the addition of auto-answer and auto-dial with battery back-up. The state-of-the-art modem chip technology employed in Nightingale requires minimal support circuitry resulting in low power consumption, low cost, high quality and extreme reliability.

Nightingale being 'hard wired' is not subject to the noise interference errors common to outdated acoustically coupled devices. In addition Nightingale features a simple self-test facility for easy installation.

Nightingale utilises a fully buffered RS 423/232 serial interface and is supplied complete with a lead suitable for connection to the BBC micro, other leads are available on request.

COMMSTAR - The Software



In order to use a versatile modem like Nightingale to its fullest potential, you will require equally sophisticated software. This is where Pace can offer you a total solution — Commstar, unquestionably the most comprehensive communications software available for the BBC.

Commstar is currently the only package for the BBC micro which offers easy access to Prestel (and other viewdata services), together with user to user communication and exceptional file transfer capabilities.

Supplied on Eprom, Commstar is instantly accessible, simple to use and extremely flexible. Just look at the possibilities:- access Prestel, Micronet, Viewfax, Homelink and Telecom Gold, rummage through bulletin boards and chat to literally thousands of other computer users, but there's more. Commstar's versatility enables the BBC to be used as an inexpensive work station for a main frame or mini-computer.

The complete Nightingale/Commstar package for the BBC micro including the modem, cabling and the Commstar Eprom and manual is just £139 plus V.A.T.

Nightingale is available separately for the BBC and other computers at £119 plus V.A.T. and Commstar is £29.57 plus V.A.T. Further details are available, please telephone or write for comprehensive fact sheets.

SPECIAL INTRODUCTORY OFFER

For a limited period, when you order the Nightingale modem you will receive discount vouchers entitling you to the following:-

KNOWLEDGE-INDEX

20% discount off standard enrolment fee (normally £25)

This remarkable collection of databases includes over 22,000,000 items covering Agriculture, Books, Business, Electronics and Computing, Corporate and Company News, Education, Engineering, Government Publications, Legal Information, Magazine Articles, Mathematics, Medicine and News/Current Affairs (The enrolment fee also includes 2 hours of free access time).

onetoone

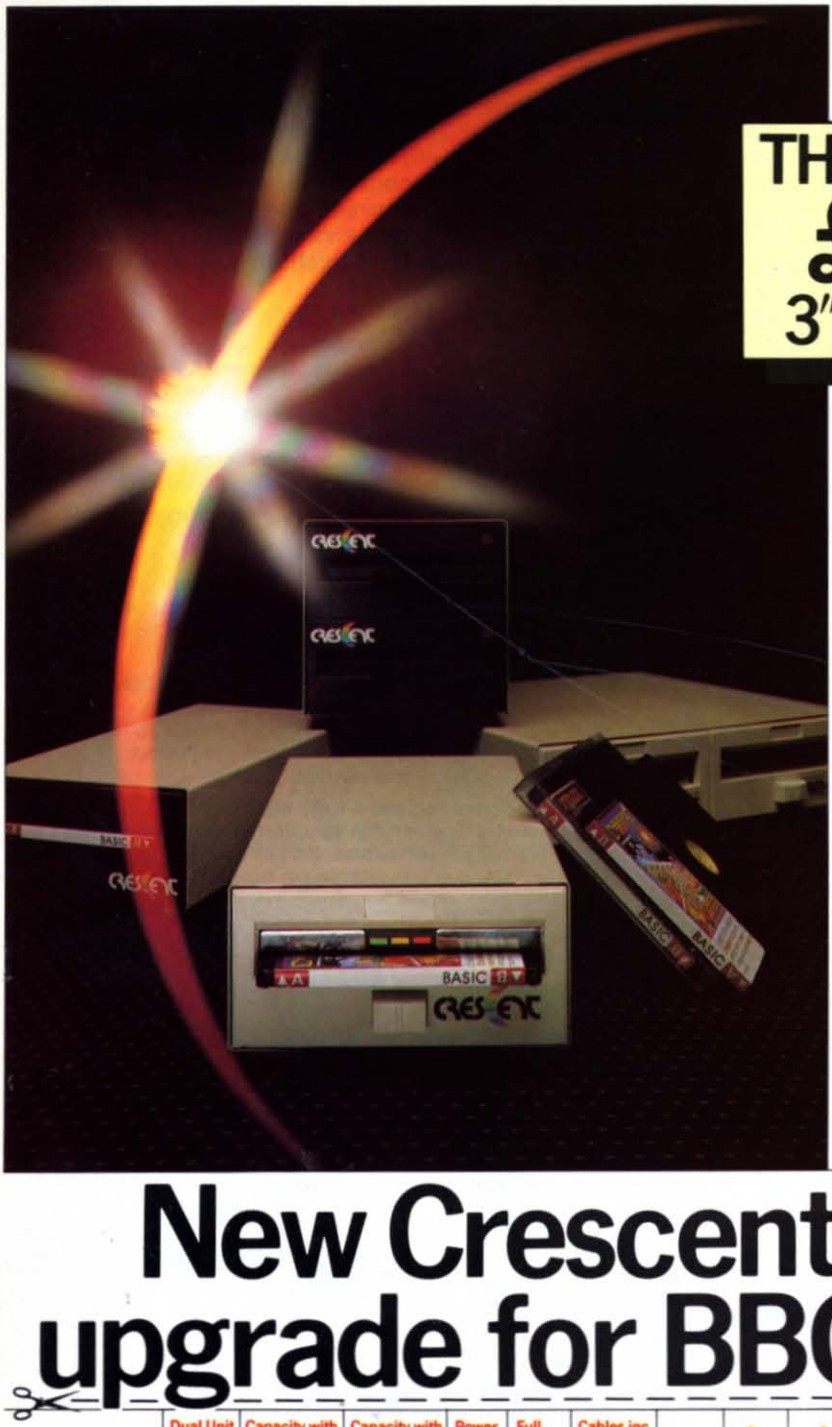
50% discount off standard enrolment fee (normally £50)

One to one is an electronic message service designed to give you the communications capabilities of a telex at much lower cost. By using your micro fitted with a Nightingale modem you can produce telexes, letters, reports and contracts, and send them in seconds to any destination. Courier delivery, priority mail and radio paging are also included in this highly efficient communications service.

PACE

PACE, 92 NEW CROSS STREET,
BRADFORD. BD5 8BS
Tel. (0274) 729306 Telex 51564

"Bringing tomorrow a little closer"



This state of the art range of 3″ CRESCENT units with Japanese mechanisms are

THE MICRO COST £129.95 3″ DISK DRIVES

manufactured by Servicon Dynamics, a company with over 15 consecutive years of specialist electronic manufacturing experience.

All items carry a 12 month warranty.

- Completely compatible with 5.25″ drives
- Full software support (plus INNER CIRCLE CLUB*)
- Full disk interface system for BBC
- No power supply needed
- Exclusive low cost accessories through INNER CIRCLE CLUB*
- One-touch disk load/unload
- Compact and lightweight

*See address below for details.

New Crescent range upgrade for BBC micro.

Type	Dual Unit (2 Drives)	Capacity with Crescent DFS	Capacity with Acorn DFS	Power Supply	Full Manual	Cables inc. in Price	Price**	Qty	£
CRESCENT 401	–	400K	200K	–	✓	✓	£129.95		
CRESCENT 402*	–	400K	200K	–	✓	✓	£199.00		
CRESCENT 421 (HorV)	✓	800K	400K	–	✓	✓	£259.90		
CRESCENT 422* (HorV)	✓	800K	400K	–	✓	✓	£398.00		
SPECIAL CRESCENT PACK A		Includes 401 + CRESCENT DFS					£217.35		
SPECIAL CRESCENT PACK B		Includes 421 + CRESCENT DFS					£330.35		
								TOTAL	
								15% VAT	
								Delivery	£6.00
								Total Due	

V = Stacked Dual Unit.

H = Low Profile side-by-side Dual Unit.

* Dual Head. ** Price excludes VAT and delivery.

Only one CRESCENT DFS per order.

Please allow 28 days for delivery.

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Tel: 0242 528213/529323. Telex: 43586 SERDYN G.

I enclose cheque for £.................. or debit my credit card.

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Signature ______________________________

THE MICRO USER
JANUARY 1985

NEWS

ATARI GUARDS ITS CASTLES

A LEADING UK software house, MRM of Grimsby, has fallen foul of the giant Atari Corporation in a dispute over a game for the BBC Micro.

Atari has taken action to protect its Crystal Castles computer software on the basis that MRM Software's Castle of Gems contained substantial similarities to the Crystal Castles program.

MRM has given permanent legal undertakings to Atari not to make, advertise or sell Castle of Gems or any other video game not by Atari which is a colourable imitation of Crystal Castles.

Carry on doctor deal

ACORN has hit back at criticism from dealers over its decision to sell a new package direct to doctors.

"We have just entered the medical market", said a spokesman, "so we want to be as competitive as possible. This means we have to keep margins low.

"If we did sell the package through dealers the profit to them would not be worth their while".

This marketing strategy makes sense, claims Acorn, because the medical market is virtually non-existent at present.

According to the company only about one doctor in 30 at present uses a micro. So in what is virtually a test market, the price has to be low to attract volume sales.

Acorn says that if the market takes off the product may be switched to dealers.

The package combines hardware and software in a starter system which can be expanded.

For £1,999 it offers a patient records system, repeat prescriptions and word processing, complete with supporting hardware – BBC Micro, double disc drive, monitor and printer.

It is available from Acorn's own distribution arm, Vector Marketing.

VIVA ESPANA FOR BBC MICRO?

ACORN is poised to grab a slice of the untapped educational micro market in Spain, estimated to be worth in excess of £100 million.

The company has already held top level discussions with senior Spanish officials during a recent meeting organised by ExportIT, the British information technology export organisation.

At that get-together it was revealed that the hardware requirement alone for Spanish schools and colleges is more than 300,000 micros.

"It will certainly be a case of Viva Espana for the company that clinches this deal", a British Government spokesman told *The Micro User*.

"The Spanish market is like the British one of five years ago, with the government there now fully committed to putting micros into its schools".

Acorn, as manufacturer of the bestselling educational micro in the UK, regards itself as being uniquely placed to penetrate the lucrative Spanish market.

But the company is not being complacent about the situation.

"We don't necessarily expect to be the automatic choice for the Spanish", admitted an Acorn spokesman.

"But the BBC Micro is already well established in education and is therefore the natural machine for the job".

Network

Nor did the man from Acorn view the fact that the company does not have a distributor network in Spain as presenting a problem.

"Because of our educational bias, we tend to go direct to government ministries, rather than setting up a distribution network", he explained.

However Acorn cannot expect to have it all its own way when it comes to Spain. Other companies are also known to be eyeing the new market.

Sinclair intends to pull out all stops to ensure that its Spectrum Plus machine finds favour in Spain.

Also snapping at Acorn's heels is Research Machines of Oxford, whose RML computer has a stronghold in inner London schools.

This company has plans for the Spanish market, according to export marketing manager Ian Thomas.

Surprisingly Dragon, which set up a manufacturing operation in Spain last July after the British company stopped trading, is not being seen as a serious contender.

Although earlier reports indicated that the Dragon might be adopted as the official schools micro in Spain, it is now believed that lack of software will rule it out.

"The competition is going to be tough, but we feel we are in with an excellent chance", insisted the Acorn spokesman.

PROGRAMMES PLAN

THE BBC is planning to get a foothold in Spain by selling its computer-related TV programmes. Contacted by *The Micro User*, a spokesman for BBC Enterprises said: "The Spanish are very seriously considering acquiring a video library on microcomputer topics".

The videos would be held by the education ministry and made available to schools and colleges.

ACORN SHRUGS OFF THREAT

ACORN is confident it can beat off any challenge to the BBC Micro's supremacy in the education market from the new Amstrad CPC464. Amstrad has mounted a campaign through its educational distributor Northern Computers aimed at Britain's 35,000 schools and colleges.

It claims it can supply 18 Amstrads with colour monitors for the same price as 10 similar BBC systems and has promised Econet interface and language and CP/M compatibility early this year.

But an Acorn spokesman told *The Micro User:* "Allegiance to the BBC Micro is very strong – it is still outstanding in networking terms for cost. In addition, our machines are in 74 per cent of schools and colleges.

"RML machines and Spectrums are in about 18 and 16 per cent respectively.

"It is extremely debatable that a fourth machine could make any significant inroads in the education market, particularly one with limited software and peripherals".

Jobs going begging in viewdata

THE boom in viewdata systems is creating plenty of jobs, but schools and colleges aren't turning out the people to fill them.

This is the claim of Information Technology and Marketing, who supplied the software for the highly successful BBC Micro driven viewdata system at the Liverpool International Garden Festival.

Sales manager Dave Phillips told *The Micro User:* "Dozens of editors will be needed in the next few months for the viewdata systems we alone are nstalling.

"Add to that all the systems installed by other firms and we are looking at hundreds of job opportunities for trained viewdata operators.

"At the moment the schools and colleges haven't woken up to this fact.

"We need to get this sort of training on the curriculum in more educational establishments so that youngsters can fill these jobs".

Already more than 2,000 schools and colleges are using the Edfax teletext emulator from Tecmedia – but mainly as an electronic notice board, not as a training tool.

KEYWORD WINNERS

WINNERS of the "Name the Keyword" competition in the October issue of *The Micro User* were J. Koorts, of Evesham, Jonathan Lewis, of Fradley, near Lichfield, and T.F. Jones, of Chatham.

Each receives an external ROM board manufactured by Micro Pulse.

Top software goes on 3in discs

GOOD news for BBC Micro users. The best selling range of software from Database is now available on hard wearing 3in discs.

Popular games like Micro Olympics and The Magic Sword and the monthly offerings from *The Micro User* plus practical programs like Mini Office are included.

Prices are £2 more than the 5¼in disc versions.

The order form is on Page 197.

Acorn go on record

Computer answers back

A TALKING computer facility is featured in Micro English, a complete English O-level course for the BBC Micro from LCL.

The 24 programs come with an audio cassette controlled by the micro and synchronised to 1/100th of a second – enabling the computer to talk to the student as well as communicating via the monitor.

This creation of a conventional teacher-pupil situation makes the programs of particular benefit to those learning English as a foreign language.

Adhering closely to the O-level exam, the course emphasises the rules of English and their application in practice, with nearly 600 questions set for either normal or multiple choice answers.

The course, priced £24.50, consists of either two discs plus audio cassette or program and audio cassettes in the tape version.

Ben, 14, is the brain behind Tubelink

HOMEWORK done, you won't find Benjamin ietti kicking a ball about with his North London choolmates and dreamng of playing for Arsenal r Spurs.

Instead he'll be bent ver his keyboard helping BC Micro owners get he most out of their machines.

Benjamin, a 14-year-old fourth former at Hasmonean Grammar School, Hendon, is editor of the magazine/database Tubelink on Prestel 258216.

It provides a wealth of information about the BBC Micro, updated at least once a week, with special emphasis on second processor users.

Its many sections include hints and tips, latest news in the "Beeb World", reviews, letters and a Tubers' directory.

There is also a comprehensive software library containing many useful programs which can be downloaded from Tubelink. Many are free although some carry a small charge.

One of the largest sections of Tubelink is "Will it or won't it?" which lists all the ROMs that will or will not work with second processors.

Almost every ROM on the market is said to be listed, together with programs that also appear to be Tube compatible.

Tubelink is interactive in that its expert contributors will try to solve problems for BBC Micro users. And the directory allows Tubers to communicate with each other and exchange views and information about computing.

Benjamin himself likes to hear from Tubers via his mailbox – 919991892. "Feedback helps me to make Tubelink even more useful", he says.

Christmas spending spree

... aided by comedian Stanley Baxter

A RECORD total of £4.5 million was earmarked to be spent on promotion by Acorn at Christmas.

Gwyn Matthews, the company's new marketing manager, confirmed that the subject of sales over the 1984 festive season had been taken "very seriously".

For the first time Acorn aimed the major thrust of its campaign at "non-middle class parents not living in the South East" – both considered key factors for relatively low micro ownership.

Television and cinema advertising accounted for £2.1 million of the total promotional big spend.

Based on the theme of the "versatile micro", the scripts featured Scottish comedian and impersonator Stanley Baxter in a variety of character roles.

Both the large and small screen promotions were allocated the backing of a 1,000 site per month poster campaign.

On the software front, Acornsoft launched more than 20 new products supported by a £310,000 advertising campaign to boost Christmas sales.

Elite, Acornsoft's flagship title, figured prominently in the seasonal push and the company claims that it achieved a first by becoming the first game to have been used directly in selling micros.

Diet on chips!

PEOPLE with weight problems can now turn to their BBC Micro for advice.

Watch Your Weight from Acornsoft is being launched as a personal weight-loss program featuring a calorie-controlled diet and a series of menu suggestions.

The user enters personal details such as height, weight, sex and so on into the program and gets a graphical illustration of whether he is over-weight, under-weight or average.

For people who fall into the dreaded overweight section, Watch Your Weight suggest it is time to go on a diet.

Watch Your Weight is published jointly with the Consumers Association and is available on cassette at £11.90.

Acorn shows the flag

ACORN was represented in Turkey for the first time this year at the country's biggest annual trade fair in Izmir.

Turkish distributor MAD Computers had a stand at the British Pavilion.

During the month-long fair, the Acorn stand was visited by 300,000 people, including ministers, ambassadors, university professors, teachers and businessmen.

A special British day was organised during the fair and the Acorn stand was one of the main attractions.

Turkey, a country of 50 million people, with 27 universities, 48,000 primary schools and 7,300 secondary schools, is forecast to be a substantial market for Acorn products.

Some schools are already using BBC and Electron micros. Small and medium sized businesses are also showing a keen interest because of the competitive prices of Acorn products.

ACORN COMPUTER INTERNATIONAL
BRITISH BROADCASTING CORPORATION
& ELECTRON COMPUTERS

Watch on stocks

WHO wants to be a millionaire? BBC Micro owners who like to play the stock market can now buy a software package to keep records of share price movements.

By keeping charts of share fluctuations, price watchers can identify short, medium and long term moves up or down, which can then be turned into profit.

At one time this was done with pencil and paper. Later it was computerised on mainframes.

Now a chart analysis company and a software firm have combined to develop a system for the BBC Micro.

The Microvest system is claimed to highlight trends, buy/sell signals and turning points.

And to save the user from having to enter his own historical share price data, the company provides it on floppy disc – freshly recorded from a central data base. The disc can then be updated week by week.

TECQUIPMENT International of Nottingham has won an order from the Open University for 150 of its new educational robots, the MA2000 which can be driven by the BBC Micro.

Structure analysers

THREE structural analysis programs for the BBC Micro have been produced by Microstructures.

Beam provides analysis for a continuous beam of up to six spans and up to 10 loads per span.

Portal provides plastic analysis for pin-base single storey portal frames, and *Panel* handles analysis of laterally loaded wall panels.

Priced £25 each, the programs are on cassette and disc.

HIGH RESOLUTION
JVC COLOUR MONITOR
£249.95
(INC. VAT.)
BRIGHTNESS
OFF ON
RGB COLOR

HIGH RESOLUTION THAT COMES HIGHLY RECOMMENDED.

"There is no doubt that the JVC range of ECM olour monitors is excellent value for money . . . here is no loss in quality of picture after long eriods . . . and remember, as more and more esolution is available with new micros, the need or a better display will be that much greater."

High recommendation indeed from Personal omputer News. Meanwhile Acorn User said:

"It seems that all 'normal' and 'medium' esolution monitors, including the Sanyo, are imply inadequate to deal with the Beeb's graphics nd text output . . . The JVC was excellent, giving lear, legible results . . . Was the JVC better than the icrovitec?* Would I buy one? Yes to both uestions."

Our RGB high resolution colour monitor (580 × 70 pixels) sells for £249.95 (including VAT) – that's a ving of over £100 compared with other leading monitors f similar specifications.

The unit has a 14" screen and is suitable for the BC Micro, Electron, Sinclair QL, Lynx, Oric, Apple, IBM nd most other leading micros.

STOP PRESS:

**PRICE INCLUDES VAT, LEADS AND CARRIAGE.
THIS IS THE LOWEST PRICE ON THE MARKET, FOR IT'S PERFORMANCE.**

And naturally there's a year's full guarantee.

If you order your monitor by post, you'll receive it within ten days by courier service.

Simply post the coupon below to: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE. Or telephone 01-701 8668 quoting your credit card number. Or, of course, you can buy at our showroom between 9.00–5.30pm, Monday to Friday.

*Microvitec Cub 14" monitor.

To: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE.
Please send me:

____ High Resolution Colour Monitor(s) at £249.95 (inc. VAT)

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I enclose a cheque for £ ____ Or please debit my credit card account with the amount of £ ____ My Access/Barclaycard (please tick) no. is ____

Please state the name of your computer ____

Name ____

Address ____

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Postcode ____

Telephone ____

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BU2

Protek package slammed in new magazine

A SWINGEING criticism of a new Prestel terminal package for the BBC Micro appears in the latest edition of *TeleLink* – a sister magazine to *The Micro User*.

Reviewer Paul Procter describes the £19.95 software from Protek as: "The worst I've encountered for that machine".

He goes on to write in the second edition of the new communications magazine: "The youngest trainee programmer is taught the importance of the ability of a program to survive the unpredictability of data input from the outside world.

"The Protek software crashes with alarming regularity, the only corrective course of action being to start from scratch and reload the software from tape or disc".

Nor is the reviewer happy with the telesoftware capability.

"Its telesoftware functions are also depressingly inadequate", he insists.

"Line noise corrupting the telesoftware end-of-frame marker causes the software to hang, as does the absence of a header block.

"Attempts at software downloading, whether successful or not, overwrite the terminal software so you must reload it to go back onto Prestel".

In conclusion, the reviewer adds:

"I believe that micro users should expect terminal software ... to perform as well as a dedicated Prestel terminal and that its extra facilities should be robust and easy to use. Both these expectations are unfulfilled".

The second edition of *TeleLink* takes a further look at the controversial subject of hackers – this time showing how security loopholes can be plugged.

It also contains an up-to-date guide on the latest in modems, a glimpse of what the home of the future may look like, and takes a first hand look at what's in store for lonely hearts on Prestel.

Nigel Short – 'only a few anxious moments'

Nigel unbeaten

IT was almost a complete whitewash when Nigel Short – the world's youngest chess grandmaster – pitted his wits against 25 BBC Micros recently.

Adjudicator Commander John Peters of the British Chess Federation ruled that the youngster had defeated 23 machines and drawn with two.

However Nigel, the current British champion, wasn't entirely satisfied with this, informing onlookers that he thought he had been beaten by the clock.

The unique confrontation between boy and machine took place in the Fratton branch of the Portsea Island Co-operative Society.

All the micros used White Knight Software Mark II.

At the conclusion of the three hour contest, Nigel conceded that the chess program had given him "a few anxious moments".

Going fishing – take your BBC Micro!

THE BBC Micro, aided by peripheral specialist Cambridge Systems Technology, has come to the rescue of a fishing tackle manufacturer who needed to compile statistics on rod performance under load.

Advanced Angling Technology produces fishing rods but was unable to analyse the casting and striking characteristics of glass-fibre and carbon rods accurately.

So a local computer consultant called in CST to design the hardware and software.

The package, Right Angle, is built around the BBC Micro.

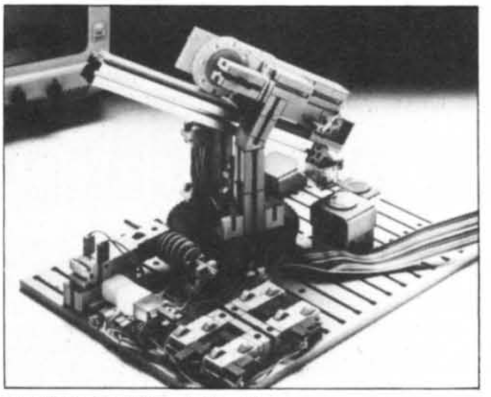
Using a customised database on a single disc drive the company wrote a routine to allow data to be loaded and referenced against specific enquiries on rod performance.

The business end of the package uses CST's Procyon IEEE-488 interface to load performance information into the database. The Procyon receives data from strain gauges mounted on the rod.

These detect the slightest bend and allow the software to draw an on-screen profile of the curve of the blank.

CST are now working on a radio link between rod and control box which will allow the equipment to be used at the waterside, with a specially packaged micro resting safely under an angler's large umbrella!

Six different robots in one



Fischertechniki's robotics kit

THE Fischertechnik building system provides a method of teaching simple robotics concepts and control theory with the aid of a BBC Micro.

The package contains all components needed to build six different robots. Each can then be broken down and reassembled into any of the others.

The six forms are a telescopic teach-in robot arm, a graphics board for music-making as well as drawing, a simple sorting machine, a lifting and sorting robot to solve the legendary Buddhist "Tower of Hanoi" problem, a plotter which uses polar coordinates and a tracking mechanism for keeping a solar cell in line with the path of the sun.

The kit contains motors, potentiometers, micro-switches, an electro-magnet and other components, as well as building parts.

Where your money went

GAMES publisher Squirrel Software has launched a home money management program for the BBC Micro.

The program – Moneywise – shows the user at a glance where all the money went – and helps him to forecast the months ahead.

To ensure privacy there is a personal password.

Treasure hunt enters final phase

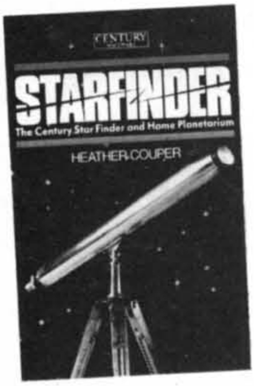
THE computer treasure hunt competition, where the grand prize is the golden Jewelled Hare of Masquerade, continues with the release of the second and final cassette by Haresoft.

For those who bought Harereraiser-Prelude, this next cassette – Harereraiser-Finale – will help solve the first puzzle, and get treasure hunters on their way to the next locations and perhaps to claim the £30,000 prize.

Harereraiser challenges BBC Micro users to find the hare with the aid of clues and graphics. The appeal of this program is that it can be solved by an inquisitive rather than an intellectual mind.

It is not a game but a brainteaser, says Haresoft.

FILL YOUR SCREEN WITH REAL STARS



RECENT interest in Halley's comet has prompted Century Communications to bring out a program – Starfinder – which, they say, does something no book can achieve.

You tell the program the date and whereabouts in the world you are – and it shows you what the night sky view should be out of your window.

You can identify any star, planet or constellation by steering a "space probe" across the screen – and print out star maps for exactly the times and places you want.

The BBC Micro program was written by Ronald Alpiar, previously a department head at the University of London Computer Centre.

It was checked by TV astronomer Heather Couper, who recently succeeded Patrick Moore as president of the British Astronomical Association.

With the program comes a book written by Heather Couper.

Heather Couper: helping you map the heavens

Mighty oaks from little...

WHEN Acorn recently brought out its new ABC business machine it caused some head scratching in West Yorkshire.

Bradford-based UCC – makers of disc drives and BBC Micro furniture – was just about to launch its own BBC Micro upgrade, also to be called the ABC.

After a quick conference, UCC decided to call its new product the Oak.

"It was about the nearest Acorn-related name we could think of", says UCC's Alan Ward.

Based on the BBC Micro, the Oak brings all its major expansions into one casing.

As well as a keyboard, the housing will take a 100 watt power unit, two floppy disc drives, Z80 and 6502 second processors, 32k memory expansion, Winchester and modem.

And because the casing is metal nearby equipment is screened from interference emitted by the BBC Micro.

For those who already have a BBC Micro, the Oak is offered in kit form. There are also four other standard models available ready-built.

Poly approves Econet bridge

ACORN Computers has launched a bridging device for Econet, its local area networking system, following a six month field trial at Manchester Polytechnic.

The bridge allows several BBC Micro networks to be interlinked, optimising data transfer and providing independent back-up and access to multiple file servers and printer servers.

Three bridged networks have been installed at the Polytechnic's Microtech Centre in the Faculty of Technology's Department of Physics, Mathematics and Computing.

Two networks, each with 18 micros, are used primarily for lecturing and project purposes.

The third network is for staff use only. Presently with only four micros, plans exist to extend this net to each staff room in the department.

A micro in each room will be capable of functioning as a free-standing micro, an Econet workstation or an intelligent terminal to the Polytechnic's mainframe.

The two classroom networks are used for courses related specifically to micros, networking or the use of structured high level computer languages, for individual student project work and for practical course tuition, lecture demonstrations and seminars.

On each student net there are two file servers, one attached to an Acorn 10mbyte hard disc drive, the other to an 800k floppy disc, a printer server and several variations of the BBC Micro system.

Said Peter Hutt, Microtech Centre manager: "Econet is worthy of merit in its own right but with bridges and hard disc store it is even more commendable".

For the future, Mr Hutt sees the Microtech Centre being increasingly used by and communicating with not only other departments and faculties throughout the polytechnic but also with outside bodies such as other polytechnics, universities, schools and education authorities.

● ***Picture shows one of the "classroom" Econet networks at Manchester Polytechnic***

CHRISTMAS CRACKER. A MEGABYTE DISC SYSTEM FOR £299·95 (INC. VAT.)

If you're thinking of upgrading your BBC Micro, your hunt for value ends here.

A one Megabyte disc drive (unformatted) double sided 80/40 track, hardware switchable and a double density Acorn compatible disc interface, for a combined price of £299.95, including VAT.

But it doesn't stop there. Because the Opus name is second to none when it comes to reliability. Our drives have been tested to the limit – running for 8,000 hours without failure – that's a year of continuous use.

And that's why we have the confidence to give a two year guarantee on all our drives.

No other company can give you that reassurance.

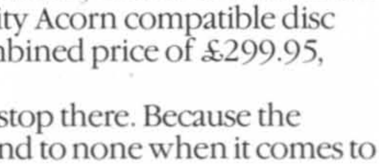
So get cracking. The offer closes on Christmas Eve.

5¼" SINGLE DISC DRIVES.

- All ½ height.
- Low power consumption.
- Comprehensive manual.
- Free utilities disc.
- Direct drive mechanism.
- Fast access time.

5400 100K Single sided 40 Track	**£119.95**
5401 100K Single sided 40 Track	**£149.95**
5402 200K Double sided 40 Track	**£169.95**
5802 400K Double sided hardware switchable 80 40 Track	**£199.95**

5¼" DUAL DISC DRIVES.



- Metal cased and all necessary leads.
- Separate power supply.
- Utilities disc and manual.

5401D 200K/400K on line S/sided 40 Track	**£349.95**
5402D 400K/800K on line D/sided 40 Track	**£399.95**
5802D 800K 1.6 Megabyte on line D/sided hardware switchable 80/40 Track	**£469.95**

OPUS 32K RAMBANK.

A 32K sideways RAM board to boost the capabilities of your micro.

Unlike ROMS, each block is individually write selectable and can write protected to ensure against accidental erasure.

If you're running short of ROM sockets, the RAM card allows you to load utilities as and when they are needed.

- Uses low power 64K dynamic RAM chips.
- Simple to install.
- Consists of 2 x 16K blocks of sideways RAM.
- Two year guarantee. **£59.95**

FLOPPY DISCS.

3" cartridge **£5.75** each or **£25.95** for 5.

5¼" Discs – with full 5 year warranty and free library case. S/SS/D **£17.95** for 10. S/SD/D **£19.95** for 10. D/SD/D **£21.95** for 10. S/S 80 Track **£25.95** for 10. D/S 80 Track **£27.95** for 10.

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Red Sky Over... where?

THE scene is one of total devastation . . .

People are desperately hunting for food and medical supplies while trying to dodge rampaging mutants and the odd earthquake.

And it's all happening in Accrington!

"In fact, it's what any visitor might see if he visited Accrington on a Saturday evening", says computer programmer Duncan Evans.

"However on this occasion things are perhaps a little bit worse because it has just been under nuclear attack".

The story line is to be found in a new strategy game for the BBC Micro produced by Vampyre Software of Leeds. Written by Duncan Evans, it is called "Red Sky Over Accrington".

Mind you, Duncan Evans and his partner Mark Ulyatt readily admit they have never been to Accrington. "It's just one of those names that lends itself to things like this", says Mark.

Mark Ulyatt, left, and Duncan Evans claim this is how they found Accrington on a typical Saturday evening

The Curry recipe!

ACORN'S Chris Curry had an undistinguished academic career – he can boast only one A level – yet he currently enjoys a salary of £60,000 a year and recently acquired a 15 bedroom mansion near Cambridge.

His fame and fortune appears to be attributable to a habit which sometimes causes him to be late for work – lingering in the bath in the morning. For this is where he says he gets his best ideas.

One of these – some six years ago – was that computers could break into the consumer and education markets . . . the rest is history.

All this is according to a profile on Acorn's co-founder which is featured in the first issue of OM.

It goes on to reveal that before he hit the jackpot with the BBC Micro he had first been a student apprentice with Pye, then a scientific assistant with the MoD, and finally spent 13 years in association with Clive Sinclair working on calculators and hi-fi.

Nor does Chris Curry claim to have any real affinity with computers today. In the article he admits to being "pretty hopeless" with computers.

"I've got a computer at home. I play games on it, I'm afraid, and rather badly too", he said.

OM estimates that Acorn is currently worth at least £100 million but that just means "100 times more responsibility", insists Curry.

What has this new-found wealth meant to Chris Curry, who is single but admits to having been engaged twice?

According to the magazine profile he has accepted it as a matter of course, though he readily admits his country mansion is a "totally unnecessary extravagance".

Not that he treats himself to expensive holidays – "they bring on an attack of worrying" – preferring to instruct his gardeners on where to plant the rhododendrons or struggle to put the accounts for the farm – which came with the mansion – on computer.

"I've always assumed that somehow I'd achieve a fairly high standard of living", he says.

"Someone told Clive Sinclair once that I was starting to make quite a lot of money, and he said, 'Chris Curry? Oh, he's always behaved like a rich man'.

"I think that's very true".

Education directory

BRITAIN'S first educational software directory will be published next spring by Hodder and Stoughton. It will contain more than 500 reviews of programs written for the BBC Micro and other computers.

The directory will be available for scanning on-line on Prestel and will form part of the international educational software directory available via Dialog and The Knowledge Index.

Elite claims mass sales

SALES of Elite, the cult adventure game from Acornsoft, exceeded 50,000 copies in the first two months following its launch.

And this, according to the company, indicates that one in every four BBC Micro users bought a copy during that period.

Elite players are being encouraged to send their scores to Acornsoft.

Each month a specially convened Order of Elite committee selects the best player to date, judged not only on points but also on skill, tactics used and dangers encountered.

The monthly winner receives £100 of Acornsoft software and a silver badge.

Winner of the first Order of Elite was Andrew Vickery, of Epsom. In two weeks of play Andrew achieved a rating of Dangerous. The next level is Deadly, followed by the coveted Elite.

Acornsoft is also planning an Elite tournament in which the best players will be invited to compete.

The announcement of the first winner was delayed to allow Acornsoft to properly verify winners' claims through the sophisticated security coding built into the game.

Crib card

BBC Micro programmers who don't have two pairs of hands will welcome the sturdy, free standing crib card from Pheonix Computer, priced £1.99.

It covers keywords and operating, graphic, sound, colour, data, input/output and disc commands, Basic statements and functions, logical operators, error messages together with hints and tips for successful programming.

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BOMB
WARP 1
ULTRON
Merry Xmas
SANTA
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WONGO...bounce along the great wall of China to diffuse sizzling bombs - avoiding arrows and gremlins. BBC...£7.95 ELECTRON...£7.95

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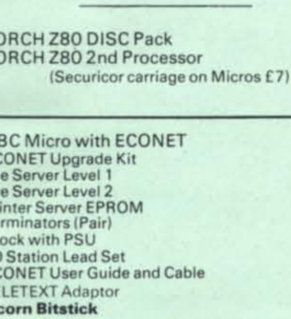
EPSON



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DOUBLE DENSITY

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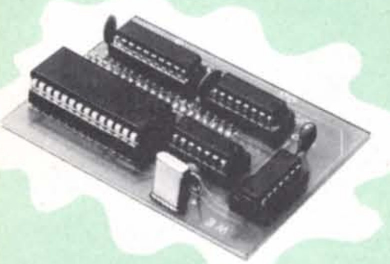

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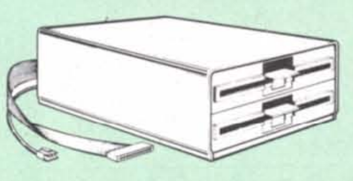

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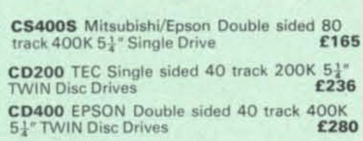

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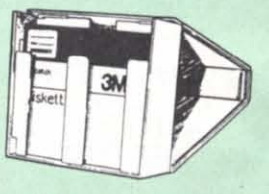

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KAGA

- KAGA Vision 2 High resolution, Colour **£245**
- KAGA Vision 3 Super High resolution, Colour **£310**

Kaga Monitors are 12" RGB colour units housed in an attractive beige plastic cabinet. They all have as standard, a genuine etched anti-glare screen.

ZENITH

12" Ultra high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too – you can really see the detail that has been put into the graphics. .... ONLY **£68**

LEADS

BNC for Zenith or Philips **£3**
RGB lead for KAGA **£5**

N.B. Carriage on Monitors **£7** (securicor)

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE

BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 200k Teac drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer, Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc. 10 × 3M discs, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

CHRISTMAS OFFER: ONLY £1,119

Access

ACCESS HOT LINE (0923 50234)
24 Hours

THE ULTIMATE DFS FOR BBC MICRO

Highly acclaimed at The ACORN and BBC MICRO USER Shows. What do the independent press say?

Good value for money – *Beebug Aug. '83*

A very worthwhile package – *The Micro User*

You'll be buying a very powerful package – *Personal Computer News*

Superior DFS: Excellent disc sector editor – *Computer Answers*

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

P.S. You can use Acorn & Watford DFS side by side in your Micro.
(Please write in for full technical specification.

PRICES:

DFS (Disc Filing System) ROM only	**£26**
Complete Disc Interface Kit including DFS ROM & fitting instructions	**P.O.A.**
Acorn's DFS Kit	**£99**
Acorn's new 1.2 DNFS ROM	**£15**

Disc Filing System Manual. (Clearly written and comprehensive) **£7** (no VAT)

Complete Disc Interface Kit including DFS ROM & Fitting instructions P.O.A.

Disc Filing System Manual. Comprehensive and clearly written £7.50 (no VAT)

P.S. We will exchange your existing ACORN DFS or PACE (AMCOM) DFS for Watford's highly sophisticated 16K DFS ROM for **£19**

Watford's DFS is exclusively available from Watford Electronics.

We do NOT retail this product through dealers. Every ROM carries a label with our LOGO and a serial number.

NEW LAUNCH

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are your tired of faulty cassettes and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford Electronic's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

There is even a handy section describing the phrases you are likely to encounter, and how to interpret them. This book must be an essential purchase at £5.95, especially if you own or are thinking of buying a disc system. Why not ask for a copy for Christmas?

Price **£5.95** (Book – No VAT)

STAR LAUNCH

ELECTRONIC DESK DIARY

for the BBC Micro

Watford's Electronic Desk Diary and Clock is a complete Diary, Alarm Clock and a Calendar. The attractively finished desk top unit comes complete with power supply, its own on-board RAM and software in an 8K ROM.

Features include:

- A complete desk diary, planner, calendar and full feature alarm clock for the BBC microcomputer.
- Software supplied on ROM for instant access.
- Over 100 events programmable into the minimum RAM.
- Events may be assigned many levels of priority.
- Diary may be opened at any date.
- Events may cause programmes to be executed at any predetermined time and date.
- Events may repeat yearly, monthly, weekly or daily.
- BBC will be powered up automatically to execute important events.
- 2K of CMOS RAM provided as standard for storing events.
- RAM expandable to 32K.
- No BBC's workspace RAM required.
- Printout of calendar for any month and year specified (between the years 1900 and 2100).
- Printout of current time and date on request.
- Easy access of time and date from BASIC and other programmes, (including M/C programmes).
- Internal power supply (no power taken from BBC).
- Interfaces to 1MHz bus.
- Battery backup optional.
- Diary compatible with all 'legal' BBC add ons and ROMs.

Watford's Desk Diary Unit is a must for every serious user of BBC Micro

Introductory Price: Only **£75**
(Carriage £2.50)

Versatile BEEB SPEECH SYNTHESISER Unit

Beeb Speech Synthesiser

SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxillary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

SPECIAL OFFER £35

Continued →

BEEB PRINTER ROM

"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

NEW RELEASE

THE EPSON FX/ KAGA PRINTER COMMANDS REVEALED

for the BBC Microcomputer
(The only Printer Book for the Epson FX-80 compatible printers).

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'The EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

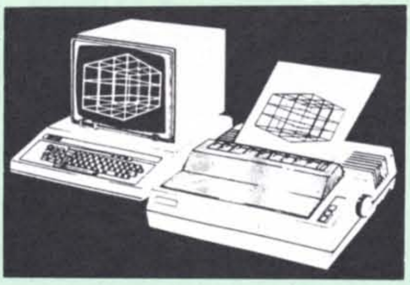
This book is superb value at only
£5.95 (Book – No VAT)

FORTH ROM for BBC

This ROM provides a complete implementation of the FIG-FORTH standard (including editor). Supplied with a large tutorial manual at only **£32**

TINY PASCAL for BBC Micro £54

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro.
It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting facilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any Mode (including Mode 8). There are various optional parameters but you need only specify the parameters you wish to change.

- V <scale>, H <scale> – These 2 byte numers give fine control over the size of the dump from minute to enormous. Unlike other dump ROMs the scale does not change with mode.
- R <0-3> – Print dump rotated by 0.90, 180, 270 degrees.
- I <indent> – Set gap from left edge of paper.
- X <min>,<max>, Y <min>,<max> – The whole of the screen graphics window area is dumped except when these parameters are given.
- P – Physical colour values are used for plotting, otherwise a negative scale is used (white darkest).
- T Two tone dump for maximum resolution.
- M <mask> – 8 bit colour mask.
- E – Contrast expansion to make mode 7 text and separated graphics stand out from the background.
- C – All mode 7 graphics are printed as contiguous to improve the shading in graphic areas.

*TIMAGE <indent> – Does a fast, text only, dump of the contents of the text window in any mode.
*GWINDOW and *TWINDOW – These commands draw the graphics and text windows, respectively, on the screen and allow them to be changed with the cursor keys. N.B. GIMAGE and GWINDOW work fully in mode 7.
Designed for use with the following printers: CP80, GP80, GP100, GP250, STAR, KAGA/TAXAN, NEC, SHINWA, GEMINI, EPSON MX/RX/FX,LPVII, DMP 100/120/200/400, CANON.

Price including comprehensive manual
£22

SPECIAL PACKAGE OFFER

Our BEEB PRINTER ROM and DUMP OUT 3 ROM to give you a complete Printer Utility package.

Normal price: **£46**
SPECIAL OFFER PRICE **£39**

VIEW

VIEW WORDPROCESSOR
We are supplying the new VIEW version 2.1 allowing printing of memory contents etc. . . **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) **£49**

EPSON DUMP ROM

This screen dump ROM is specifically designed for use with the Epson RX/FX printers and the Kaga KP810. It is extremely simple to use as there is only one command to remember. It will accurately dump any screen mode using multiple tones as required. Mode 7 is fully supported giving teletext graphics, double height etc. For those who like to keep life simple this EPROM is only **£20.**

NEW LAUNCH

EPSON FX/RX NEAR LETTER QUALITY PRINT ROM

Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set.

Standard 'pica size'
Proportional spacing
Enlarged
Underlined
Normal type

The NLQ ROM is incredibly easy to fit and use. Supplied complete with Manual.

Only: £20

NEW

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Watford Electronics are now able to supply a new View Driver package to complement any View wordprocessor system using the Brother HR15 and Juki 6100 daisywheel printers.

The facilities offered by this driver are:

Auto Underlining; Bold; Shadow; Superscript; Subscript; Proportional spacing; Pad character facility. The program is supplied on a 40/80 track disc with full instructions for its use.

The program is supplied on a 40/80 track disc with full instructions for its use.

Only £7

FX80 PRINTER DRIVER

Watford's own Sophisticated VIEW Printer Driver for FX80

To simplify using the full facilities of the Epson FX80 or Kaga KP810 use this printer driver. Full facilities are provided for selecting between fonts etc. The disc includes examples of use and instructions. Available on 40 or 80 track disc (please state which required). **£6**

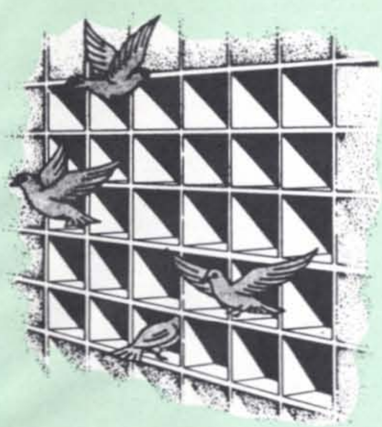
VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 and converted typewriters EX43/44 & 55.

Only: £7

TWO DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

Despite the ease of use this system provides all the facilities needed for complex data handling problems. The length of database that can be handled is only limited by the total space on the disc. You can have up to 20 fields with page length records up to 254 bytes in length. Adding and deleting records, amend titles, field names and records. Sort on any field and search for any record or group of records in any field. The database may be re-formatted after creation, the system will re-write all your files for you automatically. You may add extra fields and extend the length of existing fields freely.

Output formatting is very powerful. You are allowed 40, 80 or 132 column output modes going to printer or screen. Selected fields can be put in any order on the screen or printer, either across the paper or down. Output can start or stop anywhere in the file. Decimal fields are automatically totalled and records output are counted. Version 2, now on sale has improved input and amendments procedures giving full record edit as well as the 3 extra features . . . String searching, Calculations on numeric fields, and the ability to create sub files from your main files.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer.

File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density.

The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.

Cont.

Operations supported are –, +, *, /, +–999999 9999.9999 and compare facilities =, >,<>,<=, >=, <, &,.

Many keywords are supported by the language: assign, compare, display, end, goto, iff, ift, print, read, search, spool and update.

Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

Only £43

(Please specify 40 or 80 tracks for the utilities disc)

DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Offer **£99**

PEN PAL – VERSATILE LIGHT PEN SOFTWARE

Do you have a light pen that never gets used? Then this piece of software is for you. This package offers many useful facilities that make the light pen a useful device to own. Facilities included are:

- Pixel, Line and Character definition
- Free hand drawing
- All Colours
- Fill, Refill and stripes
- User defined "Brush strokes" plus character definer
- Grid, Scale and perspective aids 2 to 200 points palletable in one design with Circles and "rubber banding"
- Move design/character to any screen position
- Save and Load screens, User defined characters and line drawings for video titles, own programmes etc.

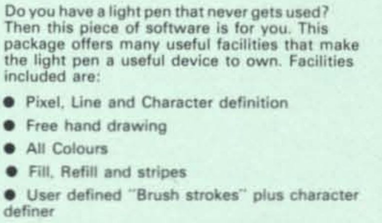
This program has many uses in education and at home. It is supplied with a comprehensive instruction manual.

Works with Watford, RH, Acorn User, DIY and many other Light Pens.

Prices

TAPE	**£10**
DISC	**£11**

LIGHT PEN



This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only **£20**

(For software on disc please add £2)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your cassette programs to disc. If you have difficulties transferring your cassette software to your disc system then this is the answer. It handles 'locked' files and full length adventures (up to &&e blocks) and programs that load below &E00. It is very simple to operate with instructions supplied. It saves you time and money.

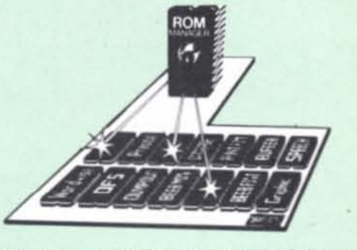
(Please specify 40 or 80 track discs) Price **£10**

ADE

Complete program development package in a 16K ROM. Full assembling and debugging facilities provided.

SPECIAL OFFER ONLY **£43**

ROM MANAGER



'Provides comprehensive management of all your installed ROMs – BEEBUG Nov. '84'.

This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.

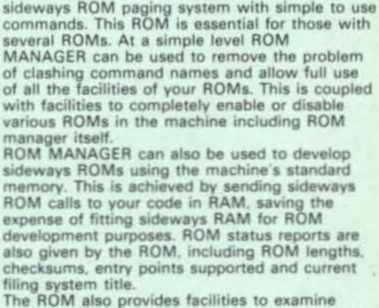
ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.

The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

All selection between particular ROMs is by the name of the ROM and this may be abbreviated for convenience. ROM numbers can also be used if required. This ROM is very simple and obvious to use. All the facilities are explained in the clear and detailed manual.

Price **£22**

BUFFER & BACKUP ROM

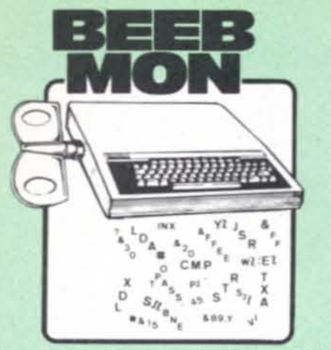


For those with sideways RAM fitted in their machines this utility ROM will make full use of this facility. By using the sideways RAM area for extra memory the following features are implemented:

★ 4K or 16K buffer for parallel printer.
★ Dumps selection of Disc files to Tape.
★ Makes backup copies of tapes on to tape and disc.
★ Displays contents of paged ROMs on screen.
★ Menu display of ROM filing system contents on Shift-Break.
★ Comprehensive manual.

Only £22

Continued →

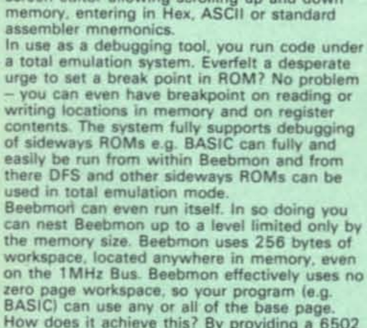


Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.
In use as a debugging tool, you run code under a total emulation system. Everfelt a desperate urge to set a break point in ROM? No problem – you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.
Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a vertual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being excuted at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

£22

Disassembler Rom

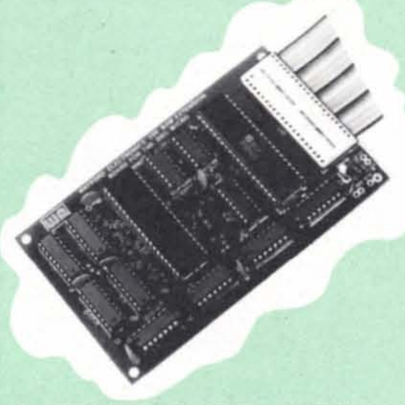


Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use programmers tool.
A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL, ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.
Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.

ONLY **£18**

32K RAM

EXPANSION BOARD



Now Watford Electronics brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. It simply plugs into your micro's 6502 processor socket. (No soldering required). This compact board which fits inside the computer doesn't just give you 16k or even 20k of extra RAM, but a massive **32K !!!**

There are many more useful facilities available with this board:

- The top 20K of the expansion RAM can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage. This allows good graphics and long programs to be combined. For instance you could have MODE 0/1/2 GRAPHICS AND 28K OF PROGRAM SPACE. The extra memory can be used by virtually any language or utility such as BASIC, VIEW, WORDWISE, Etc.
- The FULL 32K or the bottom 12K of the expansion RAM can be used as a PRINTER BUFFER for SERIAL or PARALLEL printers, sound channels, RS423, Keyboard or Speech Synthesiser. This allows very long text files to be printed while you are using 28K of program and 20K of graphics! THE BUFFER IS UNIQUE because it replaces one of the BBC Micro's buffers so all the buffer options are available on it. e.g. *FX15,21,138,145,ADVAL(–no.) etc.
- This board is the ideal complement to any word processing system, disc or cassette based. There is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on – TWO JOBS DONE SIMULTANEOUSLY!!! (an equivalent printer buffer would cost you £120 +)
- Unlike our competitors, the board is compatible with a vast range of software and hardware available for the BBC microcomputer, including our ROM expansion board, double density DFS Units and the ATPL ROM extension board. This is because our board is connected to the computer by means of a ribbon cable without soldering. It can be either be left in the micro or stuck to the lid with the 4 self adhesive feet supplied.
- The board comes with a comprehensive manual and ROM based software with a large range of commands for machine code and BASIC users, including many *HELP messages.

SPECIAL OFFER

Only: £69 (carr. £1)

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimension to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£99**

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display on screen in 13 different styles.

It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V – press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.
You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.
A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY **£39**

Mk-2 13 ROM SOCKET EXPANSION BOARD

WATFORD ELECTRONICS
13 ROM BOARD FOR BBC

Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead).

Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

CHRISTMAS OFFER: £28 (carr. £1)

WATFORD – Always a step ahead

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: **£32**

SIDEWAYS ZIF SOCKET

Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£16** (£1 carr.)

The UNICOM Modem

Are you thinking of purchasing a low cost high performance modem, but finding yourself confused by the features offered and the different prices? Well now the answer is here, in the form of The UNICOM Modem!

This fabulous modem offers the packed with all the features most Users will ever want (plus many more!) The software includes some of the most powerful, flexible and easy to use modem software ever written for a micro.

Just compare these facilities with other modems available on the market.

- Auto answer
- Auto Baud rate detection
- Auto dialing
- Auto redial
- 300/300 1200/75 75/1200 1200/1200 baud rates available
- Full and half duplex transmission
- Easy connection via the serial port of your Beeb
- Storage of upto 99 telephone numbers on disc for easy recall
- Bulletin board facilities
- Easy printer dump facilities
- Remote control facility
- Advanced error-free transmission protocol for sending data to other users

Price:

UNICOM MODEM	£49.95
UNICOM ROM Software	£20.00
UNICOM disc Software	£10.00

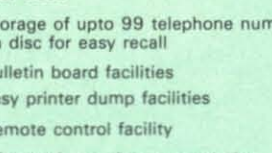
(Carriage £2.50)

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

MODEM 84

PRESTEL TERMINAL

For the BBC Microcomputer


COMMUNICATION
WATFORD ELECTRONICS GIVES YOU
"THE KEY TO WORLD COMMUNICATION"

The Watford Prestel package consists of the B.T. approved Watford MODEM 84 (1200/75 baud full duplex 1200 baud half duplex direct connect) and a very sophisticated Prestel Terminal ROM.

This totally machine code software:

- is fully compatible with not only the Modem 84 but also with the PRISM 1000 and most other modems that require a data link via an RS423/RS232 port making it a worthwhile purchase for those who already have Modems.
- supports full Prestel colour alpha and graphic characters including double height, flashing, conceal/reveal.
- called by simple *PRESTEL (*P.) command. Disc and tape configurations fully supported.
- includes a comprehensive telesoftware downloader for BBC and other programs with continuous on screen status report (an essential facility).
- has very powerful OFF LINE MAILBOX editor allowing colour flashing graphic mailboxes to be prepared without having to be on line to Prestel.
- auto logon sequence can be burnt into ROM if desired.
- a vital 'TAG' facility allows tagging and recall of interesting pages, avoids that common and annoying 'NOW WHERE WAS THAT PAGE' problem.
- includes simple page and program loading and saving functions for both disc and tape, automatically assigning frame and program directories.
- not one but TWO PRINTER DUMP ROUTINES are provided within the software allowing either full graphics dump (mode 7 to EPSON compatible printers) or ASCII characters only.
- a user function built into the software allows interface with specialist routines, (yours as well as ours).

WATFORD'S 1200 BAUD FULLY AUTOMATIC USER TO USER SOFTWARE

The addition of the WATFORD user to user ROM based software enables you to discover a whole new world of data communication.

This software enables you to use the MODEM 84 very powerfully.

- Send and receive error checked programs and files (even WORDWISE files) to and from other users at 1200 baud.
- 8k file transfer in under 2.5 minutes (approx four times faster than with 300 baud modems).
- The transfer of data is totally AUTOMATIC which means that the modem is automatically switched between transmit and receive under software control.
- A chat mode is provided which also has this automatic switching for receive and transmit. (This mode is essential just before and after data transfer when both hand sets are replaced to reduce noise).
- A copy facility is provided which allows transmission of all screen output.
- A continuous on screen modem status report is included.
- The software is totally function key driven enabling easy transmission, reception, saving and loading of programs and files (Basic, Machine code or Data).
- A help menu is available from within the software as an aid to use.
- Full instructions are supplied.

PRICES

MODEM 84
(with Lead & Manual) **£68**
MODEM 84 complete with PRESTEL SOFTWARE ROM, Lead and Manuals **£82**
PRESTEL SOFTWARE ROM
+ Manual **£20**
USER to USER SOFTWARE ROM **£15**
(Carriage on Modem **£2**)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. Suitable for computers, Hi-Fi, Fridge Freezers etc. Max. Surge current 2KAmp; max. Voltage 250. Essential for serious computer users.

Protection for only **£8.50**

Continued →

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£6.95
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Cassette version of above	£10.00
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6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£14.25
6502 Machine Code for Beginners	£5.95
6502 Machine code for Humans	£7.95
6502 Software Design	£10.50
A young persons guide to BBC Basic	£4.50
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Advanced Machine Code Technique for BBC	£7.95
Advanced User Guide for BBC Micro	£11.95
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Creating Adventure Programs on BBC Micros	£6.95
Creative Graphics Cassette (Acornsoft). Has 36 graphics programs	£8.95
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Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
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SPECIAL XMAS OFFER

BEEBMON – The most sophisticated Machine Code monitor ROM for the BBC Micro.

Normally: £22 **NOW: £18**

FILE-PLUS – A most versatile 16K ROM Based DATABASE for the BBC.

Normally: £42 **Now: £36**

PENGO

One of the 10 best arcade games developed for the BBC micro in 1984 'Acorn User, December 1984' is now available at a special Christmas price of:

Only: **£5**

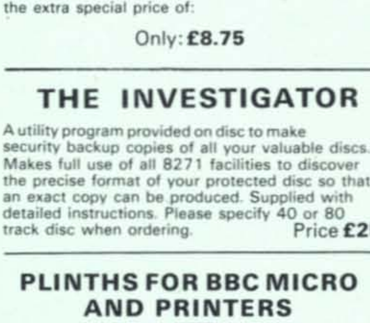
For a superb value, last minute stocking filler (5:55pm on Christmas Eve!) why not purchase both 'THE CRAWLER' and 'PENGO' games at the extra special price of:

Only: **£8.75**

THE INVESTIGATOR

A utility program provided on disc to make security backup copies of all your valuable discs. Makes full use of all 8271 facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering. Price **£25**

PLINTHS FOR BBC MICRO AND PRINTERS

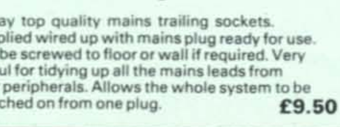


Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid.

The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

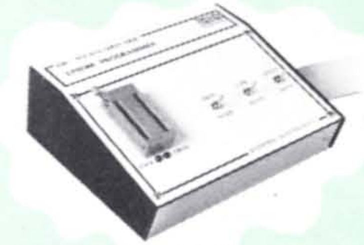
SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£20** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug. **£9.50**

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and integrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.

Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

CHRISTMAS OFFER £69

(£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28**
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**
- Spare UV tubes. **£9**

VOLTMACE DELTA 14 JOYSTICK SYSTEM

The Voltmace system provides full facilities for connecting the Delta 14 handset.

Delta 14 handset – On its own makes a high quality centre sprung analogue joystick with fire buttons **£12.50**

Adaptor Module allows use of two joysticks and provides hardware to access all the keys on the keypad of the joystick **£12.55**

Transfer program allows use of the keypad keys and joystick to simulate any key on the keyboard. This works by creating a machine code patch that stays in memory while another program is loaded in. Allows any game to be used with joysticks. Supplied on disc or tape.

Tape **£5.10** Disc **£7.95**

STANDARD JOYSTICKS

These are standard analogue type with a fire button on each joystick. Twin joysticks go to a single moulded plug, long leads provided.

Single Player version **£9.75**
Two Players version **£15.00**

ANTI GLARE MONITOR SAFETY SCREEN

HEADACHES? TIRED EYES? Don't take pills — Use a Watford Electronics anti-glare filter! Considerable research into the possible health problems associated with monitor screens has shown that eye strain, blurred vision, watering, itching eyes and headaches can result after prolonged use. The problems are caused by extraneous reflections which force the eye to continuously re-focus to try to ignore them. The answer is our contrast enhancement, anti-glare filter which is similar to those which have been previously available on business systems, but at the low cost that you would expect for your personal computer. You will soon find the reduction in eye strain well worth your investment.

Features:

- Simple fitting with sticky Velcro pads.
- Easily removed for cleaning.
- Tinting improves colour quality and contrast.
- Works on monochrome or colour monitors.
- Curved instead of usual flat screen reduces edge distortion.
- Made in Britain by a long established glass maker.

Available in 9", 12" and 14" versions – please specify when ordering.

Introductory offer price: **£14.95**(carr.£1)

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£12** (£2

DATA RECORDER AND ACCESSORIES

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter. **£20**

DATA CABLE to connect recorder to BBC **£2.50**

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

ASSORTED CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**

MONITOR LEADS

Microvitec RGB leads 6 pin DIN to 6 pin DIN for colour monitors.	**£2.50**
KAGA/SANYO Colour Monitor Leads	**£5.00**
Monochrome monitor leads BNC to Phono	**£3.00**

DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles)15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–

NEW RELEASE

SOUND EFFECT (ENVELOPE) ROM

BEEP
POW
ZAP
WOW
FIRE
BLIP

Now for the sound fanatic or those of you who want to drive the pet crazy. Watford Electronics offers you this unique piece of firmware called the Envelope ROM. It contains a wide range of sound effects, in fact enough to ZAP, BANG, SQUEAK and EXPLODE your way through a whole galaxy of games. Some of the more unusual effects include ZIT, TRIMPHONE, SNAPPER, TARDIS, and a whole host of explosions, gun fire, winning and losing sounds and many other effects to aid the progress of a game.

The sounds are accessed via single star commands, the pitch and duration of any of the sounds can be altered from their default value at any time by adding extra parameters. These parameters can take the form of decimal values or the resident interger variables. With a choice of OVER 65 sounds, you should have no more excuses for failing to include some form of sound effect in your latest piece of software.

This ROM is a must for the amateur games designer and all those who hate creating envelopes. It is supplied complete with instructions for

ONLY £18

SPECIAL OFFER

EPROMs for sideways ROMs
2764-250nS **£4.70**
27128-250nS **£16.00**

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards
6116LP (2K) **£3.75)**
6264LP (8K) **£19.00**

FIRMWARE

ACORN 1.2 DNFS ROM	**£15.00**
ACORN 1.2 OS ROM	**£10.00**
ACORN BASIC 2	**£30.00**

MODEM ROMs

TERMI	**£26.00**
COMMUNICATOR	**£56.00**
COMMSTAR	**£27.00**

FLEXIBLE KEYBOARD CONNECTOR

Frequent removal of the BBC Micro keyboard can result in the ribbon cable connector either breaking off or giving intermittent fault. We can now supply a highly flexible replacement keyboard connector at **ONLY: £4.95**

CHIP EXTRACTION TOOL

This extremely useful tool allows trouble-free IC removal from your computer. No longer do you have to weald a screwdriver at your valuable ROM software, instead this IC extractor is constructed from tough nylon and provides full distribution of the removal force over the whole body of any 24 or 28 pin device, thus preventing undue damage to your chips.

Isn't £1.50 a small price to pay to protect your ROMs stature?

Price: Only **£1.50**

GEMINI BUSINESS SOFTWARE

CASHBOOK	**£46.90**
DATABASE	**£15.50**
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PAYROLL	**£31.00**

(P.S. For disc based software please add £3)

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COLOSSAL ADVENTURE	**£8.50**
ADVENTURE QUEST	**£8.50**
DUNGEON ADVENTURE	**£8.50**
SNOWBALL ADVENTURE	**£8.50**
LORDS OF TIME	**£8.50**

Please add £2.50 for Discs

MISCELLANEOUS

28 pin ZIF SOCKET (Textool) **£6.95**

28pin DIL PLUG

SOLDER type	**£2.90**
IDC CRIMP type	**£3**

RIBBON CABLE

28way **55p/ft;** 34way **60p/ft.**

8way DIP SWITCH **£0.85**

CHIP SHOP CORNER

7438	**75p;**	74LS00	**30p**
74LS04	**35p;**	74LS10	**30p**
74LS123	**120p;**	74LS163	**85p**
74LS244	**£1;**	74LS245	**£2**
74LS393	**120p;**	4013	**60p**

4020 CMOS	**£0.90**
4816 16K DRAM	**£3.00**
UPD7002	**£7.25**
6502A CPU	**£5.45**
65C02 CPU	**£9.50**
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SAA5050 Teletext	**£8.75**
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SN76489 sound gen.	**£5.50**
2764 8K EPROM	**£4.75**
27128 16K EPROM	**£16.00**
6116L 2K S RAM	**£4.50**
6264L 8K S RAM	**£24.00**

Prices subject to change without notice and available on request.

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CARRIAGE: Unless stated otherwise, please add £1 to all cash orders.

VAT: UK customers please add 15% VAT to the total cost incl. Carriage.

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ACCESS ORDERS: Simply phone: Watford (0923) 50234. (24 Hours)

Watford Electronics

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1200
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1200
1200 EQU
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Modem WS 2000
APPROVED for use with telecommunications systems run by British Telecommunications in accordance with the conditions in the instructions for use
S/2637/3/E/500087

Trade enquiries invited

Software packages

Off-the-shelf dedicated software packs for most major computers: DataTalk for IBM PC/PCXT, VICOM for colour Prestel plus bulletin boards on Apple, many packages for BBC, Commodore and other computers. WS2000 covers the field.

Satisfied Users

"This modem is so simple to use." – Miss VAB of Bristol.

"It's got every feature we need – even telex use." – Company director Mr JLK of Wigan.

"What a wonderful machine! Its operation is quite faultless." – Mr CJC of Beaconsfield.

Enthusiastic Press

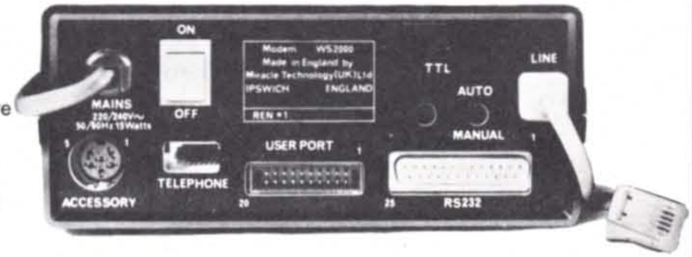
"The best value for money in the modem field." Quentin Reidford, APPLE USER.

"Very versatile; good value." Peter Tootill, PCW.

"Could turn out to be the peripheral you can't live without." Ralph Bancroft, PCN.

Expansion Accessories

WS2000 can grow to suit your needs! The modem's unique User Port lets a computer access all the modem's functions – full software control is possible. Auto answer and auto dial plug-in accessories let your computer accept and initiate telephone calls. TTL interfacing, acoustic coupling, battery back-up, process control interfacing – they're all possible for the WS2000 owner.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A COMPLETE PROFESSIONAL WORD PROCESSING SYSTEM

Plus for the Kids as an Xmas Bonus

A FREE lightpen with supporting Software or Acornsoft's Elite. See Star Bargain

ACORN COMPUTER SYSTEMS

BBC Model B Special Offer	£320 (a)
BBC Model B + Starter Pack	£348 (a)
BBC Model B + DFS	£409 (a)
BBC Model B + Econet	£389 (a)
BBC Model B + Econet + DFS	£450 (a)
BBC Dust Cover	£4 (d)
Pair of Joysticks	£14.50 (d)

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A to B	£65 (d)	Installation	£20
ACORN DFS Kit	£95 (d)	Installation	£15
Econet Kit	£55 (d)	Installation	£25
Speech Kit	£47 (d)	Installation	£15
BASIC II Rom with user guide	£22.50		
1.2 O/S Rom	£7.50	DNFS Rom	£17.50
4816AP Memory upgrade RAM	£2.00		

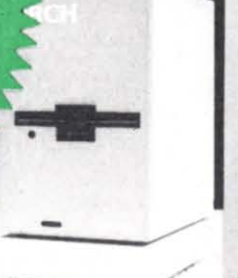
ECONET ACCESSORIES

Terminator (Two reqd per installation)	£31 (c)	File Server Level II	£216 (c)
Clock with psu	£39 (c)	10 Station Lead Set	£26 (c)
Printer Server Rom	£41 (c)	Extra Econet cable	£1.50/m (d)
File Server Level I	£86 (c)	Econet User Guide	£10 (d)

ACORN BITSTICK

The renowned CAD package, providing unprecedented graphics facilities for the draftsman, engineer and graphics student — a 'word-processor' for graphics. Allows accurate drawing [illegible] lines, circles, curves etc — colours can be easily chosen from a pallette. [illegible] is a FX80 dump routine easily [illegible] om facility allows a part of a [illegible] a drawing to be magnified [illegible] to 48 drawings on a disc [illegible] library system for easy [illegible] d easy to use allowing [illegible] ed on software £325 (a)

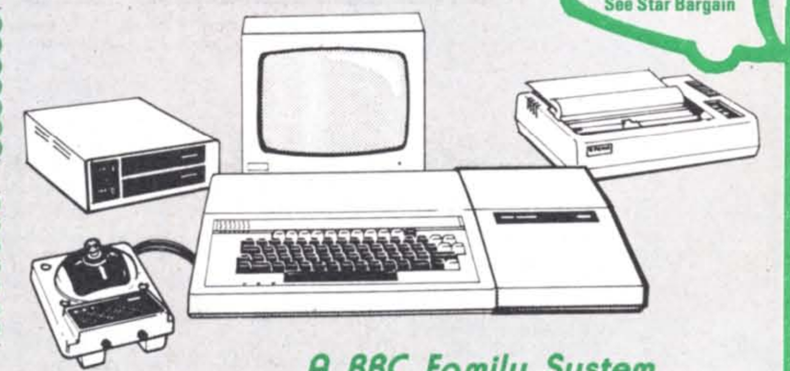
STAR BARGAIN
Complete Word Processing System for only £1175 + VAT
Comprising: BBC Model B + DFS
2 × 400K 40/80T Dual Teac Disc Drive
(ideal for future upgrade for Z80)
Sanyo/Kaga Hi Res. Green Monitor
Juki 6100 Daisywheel Printer
Acorn 'View' Word Processor
Juki Printer Driver
All necessary Cables, Manuals etc.
and as an Xmas bonus for the kids!!
we are including a Light-Pen with
Software! or Acornsoft's Elite
The choice is yours.



[illegible] the [illegible] 8000 cpu [illegible] a UNIX operating system, or set up a network of upto 254 machines. All these capabilities are available NOW.

TORCH UNICOMM

For the Torch Z80 card user, comes a superb communications package. A BT approved modem using 1200/75 and 1200/1200 baud is supplied complete with BBC RS232 cable. Three superb software packages in CP/M included, clearly demonstrate TORCH's experience on the communications scene: UNIVIEW for PRESTEL type use, allowing saving of frames, downloading of files etc. UNITERM is a sophisticated terminal emulator. UNIMAIL is an amazing package specifically for TORCH users. Among other facilities, it allows messages and files to be accessed from distant machines — access to files can be controlled by hierarchial passwords. Hardware + software: £159(a)



A BBC Family System

ACORN Z80 2nd Processor

This processor converts your BBC into a complete business micro with all the computing power a professional would need. The system is CP/M based and is supplied with a very extensive software package. The package includes three office productivity programs, (memoplan, fileplan and graphplan), Systems generator program, three programming languages plus the ACCOUNTANT business program. Software is accompanied by extensive manuals that not only get you started but also answers your whys and hows.

All for only £399 (a) (incl VAT)

See our section on CP/M software for other packages available for use with this processor.

ACORN 6502 2nd Processor

This processor is designed for the serious computer user who wants to get even more out of his computer. This processor provides increased memory — allowing up to 44K for Basic programs and up to 60K for assembly language programs, regardless of screen mode in use. (ideal for VIEW). An increase in speed means that programs run up to 50% faster. The second processor/BBC combination offer computing power comparable to systems costing twice as much. £175 (a)

TORCH GRADUATE SYSTEM

The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. (will run Lotus 123!). With 256K RAM and single/dual drives, it simply connects through the 1Mhz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the superb Xchange range of software, and includes a full-feature word processor, a financial planner, a database and a business graphics package — all 'linkable'.

G800/2: £945(a) Full Spec. & prices on application.

Z80 Card ZEP100 with PERFECT Software Packages + Z80 Basic	**£299 (a)**
Z80 Disc Pack ZDP240 with software as above	**£699 (a)**
20Mb Hard Disc + 1 × 400K Floppy Drive	**£1,950 (a)**
UNICOMM Communications Package + modem	**£159 (a)**
Unicorn 68000, Unix OS/Z80B/256K, 20MB Hard Disc, 400K Floppy	**£2995 (a)**

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

KAGA TAXAN:

- * Epson Compatible Control codes
- * 80 or 156 Column
- * NEAR LETTER QUALITY Print using 23 × 18 matrix
- * Text Modes include Normal, Italic, Enlarged, Condensed, Super/Sub Script, Proportional
- * Dot Addressable graphics in various modes
- * 3K buffer which can also hold user defined characters
- * Extra socket for eprom with custom made font
- * Friction & Tractor feed with built in paper roll holder

KP810 (80 coloumn) **£249 (a)**
KP910 (156 column) **£359 (a)**

EPSON:

The industry standard printer offering the quality, reliability and versatility.

RX80T **£215 (a)** RX80FT **£225 (a)**
RX100 **£345 (a)** FX80 **£315 (a)** FX100 **£435 (a)**

DAISY WHEEL

BROTHER HR15: • 14 cps • 3K Buffer • Two colour printing • Porportion spacing • Underline • Bold & Shadow printing • super/Sub script + many other features.

BROTHER HR15 **£340 (a)**

JUKI 6100: • 15 cps • 2K Buffer • Switchable 10/12/15 cpi • Proportional printing • Linear Motor for max reliability.

JUKI 6100 **£340 (a)**

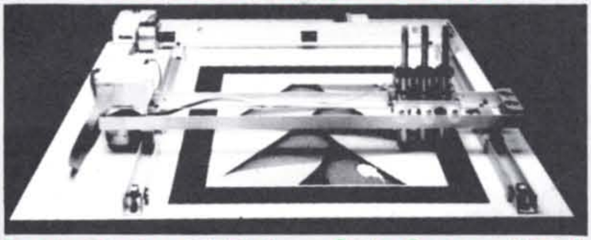
ACORN VIEW PRINTER DRIVER GENERATOR

This printer driver generator will end your search for the printer driver that suits your printer. You can fully exploit all the features of your printer by generating a driver to suit your particular printer. All you need to do is to answer a series of simple questions relating to your printer and you will have your driver. You can generate as many types of printer drivers as you require. Screen driver supplied with the printer driver enables highlighted text to be displayed on the screen showing the effects of underlining, bold, superscripts, subscripts, italics etc. MPRINT program enables more than one file to be printed at a time including the current text. Comprehensive manual supplied with the disc. **£10(d)**

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scriber can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs. Workstation comes complete all accessories.

Workstation Complete £490(a)



Basic Plotter **£270(a)** Opto Sensor **£72(c)**
Drill/Router Attachment **£79(c)**
Power Supply: PS12V **£42(c)** PS24V **£78(c)**

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON
Paper Roll Holder £17(d) FX80 Tractor Attachment £37(c).
Interfaces: 8143 RS232 £28(c); 8148 RS232 + 2K £57(c);
8132 Apple II £60(c); 8165 IEEE + Cable £65(c).
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 £5.00(d); RX/FX/MX 100 £10(d);
FX80 Dustcover £4.50(d)

KAGA TAXAN: RS 232 Interface + 2K buffer £85(c); Ribbon KP810/910 £6(d)

JUKI: RS232 Interface £65(c); Spare Daisy Wheel £14(d); Ribbon £2.50(d);
Sheet Feeder £199(a); Tractor Feed Attach £99(a)

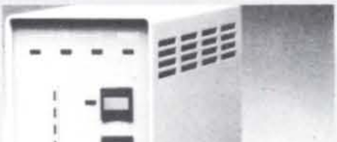
BROTHER HR15: Sheet Feeder £199(a); **Ribbons Carbon or Nylon** £4.50(a)

BBC Printer Lead: Parallel (42") £7(d); Serial £7(d)
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):
2000 sheets 9.5" × 11" £13(b) 2000 sheets 14.5" × 11" £18.50(b)
Labels: 2-3/4" × 1-7/16" in quantities of 1000
Single Row: £5.25/1000 (d); Triple Row: £5.00/1000 (d)

PRINTER SHARER/BUFFER

A unique printer sharer/buffer that provides a simple way to improve the utilisation of the installed equipment by reducing the waiting time for printing documents. All but the smallest documents tie up the computer while being printed and the computer remains out of use until the printing is complete. This is more so in a network which does not have a dedicated computer for printer operation. This buffer/sharer would free the computers almost immediately for other uses and in many cases make the use of dedicated printer server machines unnecessary.



- * Standard Centronics interface with 3 inputs.
- * Each input port scanned every 5 secs to check for data. Switching between ports completely automatic.
- * Data input rate 4800 bytes/sec
- * LED Bargraph indicates percentage memory used.
- * COPY key allows current document to be reprinted.
- * Internal check to prove the data integrity.
- * PAUSE switch allows printing to be stopped temporarily to allow paper change, adjust form feed etc. or allows temporary storage for large number of small files which can all be printed together.
- * RESET allows all buffer memory to be cleared without having to hard break on the computer.
- * 64K buffer capacity. * Mains powered * Compact 7cm × 17cm × 24cm

TSB 64 Buffer/Sharer **£245(a)**
Cable Set **£30**

PRINTER & COMPUTER SHARERS

Three Computers to one printer (parallel) £65(b)
Six Computers to one printer (parallel) £129(b)
Cable Set for three way sharer (ea. 1m long) £25(c)
Cable Set for six way sharer (ea. 1m long) £45(c)
Above sharers can be powered from the BBC
Exernal mains adaptor for Printer Sharer £7(d)
Computer Sharer to connect 2 printers to one Computer (parallel) £19.50(c)

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 × 192mm + menu area. Comes complete with a CAD package. £110(b).

01-208 1177

Please add carriage: (a) £8; (b) £2.50 (c) £1.50; (d) £1
and VAT at 15% to order. Carriage (a) sent by Datapost

MONITORS

All monitors supplied with BBC lead

MICROVITEC 14" RGB

1431 Standard Resolution £165(a)
1451 Medium Resolution £255(a)
1441 Hi Resolution £399(a)

MICROVITEC 14" RGB with PAL & Audio

These monitors can receive TV programs thru a Video Recorder

1431AP Standard Resolution £210(a)
1451AP Medium Resolution £310(a)

All 14" monitors now available in plastic or metal cases, please specify your requirement.

MICROVITEC 20" RGB with PAL & Audio

2030CS 1 Std Res £380(a) 2040CS Hi Res £685(a)

MICROVITEC 20" RGB

2031 Std Res £260(a) 2040CS Hi Res £570(a)

KAGA TAXAN 12" RGB

VISION II Hi Res £245(a)
VISION III Super Hi Res £345(a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£90(a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£99(a)
KAGA KX1202A Hi Res 12" Etched Amber Screen	£105(a)
ZENITH 123 Hi Res 12" Green Screen	£68(a)
ZENITH 122 Hi Res 12" Amber Screen	£68(a)
Swivel Base for Kaga Monochrome fitted with Digital Clock	£21(c)
Monitor Plinth for the BBC	£13.50(b)
Double Tier Plinth for BBC and flat pack dual drive	£19.50(b)

BBC Leads Kaga RGB £5(d) Microvitec £3.50(d) Monochrome £3.50(d)

RB2 TRACKER BALL

Marconi
RB2

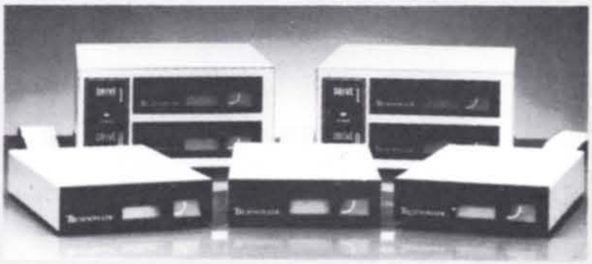
IDEAL FOR XMAS

Marconi with its years of experience making tracker balls for use in Military and Air Traffic Control have developed a quality device for the serious hobbyist, for educational uses, and for low cost CAD/CAM applications. RB2 is a compact, ergonomically designed tracker ball that provides precise positional control and rapid direction changing using a freely rotating resin ball in any direction without the limiting stops or the zero point drift of joystick controls. Three switch buttons enable easy software manipulation to incorporate the use of the tracker ball. Appropriate software will enable the RB2 to take over the functions of cursor keys in word processing, CAD/CAM applications and two dimensional positional control of robots, drillheads etc. RB2 which plugs into the user port is supplied with utlity programme to use it as a joystick with other software, a comprehensive graphics/CAD program and a program demonstrating its editing capabilities. User guide includes instructions on writing your own programs for the RB2. £52(b)

SANYO DR101 DATA RECORDER

A high quality data recorder with switch selectable data/normal modes as well as cue/review and tape counter providing a reliable cassette storage system. DR101 with data lead £30(c) Extra Data Lead £3(d)

DISC DRIVES



TECHNOMATIC disc drives come fitted with high quality slimline Japanese mechanisms and represent the state of art in disc drive technology. They are built to highest standards and are all tested to their full performance capability before packaging. Single drives are offered with or without integral power supply whilst the dual drives are supplied with generously rated switch mode power supply. Attractively designed steel casings are painted in hard wearing BBC matching paint. All drives can operate in single and double density modes. Drives are supplied with cables, manual and formatting disc and are ready to be fitted to the computer.

Single Drives

1 × 100K 40T SS	: TS55A £100(b);	CS55A with psu £125(b)
1 × 200K 40/80TSS	: TS55E £140(b);	CS55E with psu £150(b)
1 × 400K 40/80TDS	: TS55F £155(a);	CS55F with psu £169(b)

Dual Drives

2 × 100K 40T SS:	TD55A with psu £250(a)
2 × 200K 40/80T SS:	TD55E TEAC with psu £325(a)
2 × 400K 40/80T DS:	TD55F TEAC with psu £380(a)
2 × 400K 40/80T DS:	TD55M Misubishi with psu £360(a).

NEW

DISC DRIVE MULTIPLEXER

A simple device that enables up to four computers to be connected to one single or dual drive. Ideal unit for installing in classrooms where networking is not planned or necessary or the costs have to be kept low or where software information is shared. Several of these units can be installed in series to connect more computers to access the same discs. Units supplied with 5' of cable per outlet as standard.

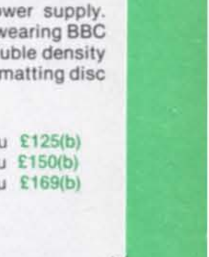
Write for full details.

TDM 4 Quad Unit (upto 4 computers) £135(a)
TDM 2 Dual Unit (2 computers) £75(b)

Note: All computers must be fitted with a DFS

3M FLOPPY DISCS

**Authorised Distributor
Data Recording Products**



£1 Wine Voucher with purchase of every 20 discs — offer ends 31st December

Industry standard high quality discs with guaranteed error free performance for life. £1 Wine Voucher with purchases of every 20 discs — offer ends 31st December.

Discs in packs of 10:

40T SSDD **£15(c)**	40 T DSDD **£18(c)**
80 T SSDD **£22(c)**	80 T DSDD **£24(c)**

DISC ACCESSORIES

Single Dsic Cable £6(d) Dual Disc Cable £8.50(d)
10 Disc Library Case £1.80(d) 30 Disc Case £6.00(c)
Lockable Storage Boxes 30/40 Discs £14(c) 100 Discs £19(c)

The FLOPPICLENE disc head cleaning kit is the ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminate the risk of recontamination and abrasion of the sensitive disc heads and ensure continuously reliable data capture and transmission.

Floppiclene with 20 disposable cleaning discs. £14.50(b).

COMMUNICATIONS

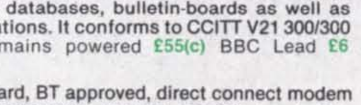
We offer the customer a choice of BT approved modems and suitable communication software, enabling the user to choose an ideal cost-effective system, perfectly suited to his individual needs. We stock modems for every requirement, whether it is for the business, or private user, whether you require access to a public database, bulletin boards or a mainframe, whether for local or international use.

MODEMS

TORCH UNICOMM See our section on Torch for further details.

ACORN PRESTEL The dedicated Prestel adaptor complete with integral, BT approved, auto-dial modem and software in ROM £120(b)

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as intercomputer communications. It conforms to CCITT V21 300/300 Baud Standard. Battery/mains powered £55(c) BBC Lead £6 External PSU £9(c)



WS2000 A world standard, BT approved, direct connect modem switchable between 75,300/300,600, 1200/75, 75/1200 baud. It is compatible with Bell 103/113/108, 202 and CCITT V21 & 23 standards and allows you to communicate with virtually any computer system in the world. This is the new generation modem that was chosen by the BBC to demonstrate a totally reliable USA-UK data link live on TV — it performed faultlessly in front of an audience of millions. This modem will cover Prestel, Micronet, Telecom Gold, Distel, Microweb, One-to-One, Bulletin Boards both in the UK and abroad, etc. etc. as well as user-to-user communication. It also has a rather useful facility of 'Reverse-Prestel' mode i.e. 75/1200 so that you can communicate with other users who only have a standard 1200/75 type modem. What possibly gives this modem its biggest advantage is its option of computer controlled switching between all modes of operation. In addition, separate auto-answer and auto-dial cards are available, giving this modem possibly the greatest potential of all. Mains powered. £129(c). Data Cable £7; Auto Dial Card £30(d); Auto Dial Cable £4; Auto Answer Card £30(d); Ski Software Control Kit £14(d).

DS1 menu driven software to hold directory of telephone nos and configuration data. Only one key entry to call any number. Operates with auto dial, SK1 and Commstar. £10(d) (please specify 40 or 80T).

TELEMOD-2 A BT approved modem complying with CCITT V23 1200/75 Duplex & 1200/1200 Half-Duplex standard, that allows communication with Viewdata services e.g. Prestel, Micronet etc., as well as using 1200 Baud for communicating with other computer users. Mains powered. TELEMOD 262(b) BBC Lead £7.00

COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. All input may be copied into a buffer in memory over which full control is available. Controls of protocols are very simple and any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time-clock. £29(d)

TERMI-II A good all round package for communicating with notice boards, electronic mail services etc. Termi is a semi-intelligent terminal emulator allowing the BBC to act as a dumb terminal, slave BBC graphics terminal, or VT52 terminal. The rates at which data is sent or received is easily set up with rates of up to 4800 Baud with 40/80 col. selectable. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Termi is not suitable for PRESTEL). £28(d)

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). £59(d).

EPROMER II

This enhanced eprom programmer will handle the full range of popular single rail eproms. Its sophisticated menu driven software makes the programming of eproms simple and efficient. Features included in this programmer are normally found in industrial grade programmers costing many times more.

- Interfaces with the BBC tyru 1Mhz bus. Fully buffered and complies with the Acorn protocols. Integral mains power supply ensures no power drain from the computer.
- EPROMER II will handle 2516, 2532, 2564, 2716, 2732, 2764, 27128 and 27256 single rail eproms.
- All eproms up to 16K programmed in single pass.
- Fully software driven with easy to follow user friendly instructions displayed on the screen. Total control from the keyboard — no knobs to fiddle with.
- Eprom type selectable from the keyboard.
- Selectable programming voltage 25/21/12.5V.
- Defaults to normal programming — high speed algorithmic programming selectable.
- Can READ, BLANK CHECK, PROGRAM and VERIFY at any address/addresses.
- Constant display of eprom type, option and address range selected.
- Full screen editor with HEX or ASCII input.
- Full TAPE/DISC filing facility.
- Several basic BBC BASIC programs can be entered on a single eprom and called up with individual name.
- Comprehensive manual.

EPROMER II with software Cassette £99(b)
Disc based Software £3 extra

UV ERASERS

UVT1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59(b).
UV1 as above but without the timer. £47(b).
For Industrail Users, we offer UV140 & UV141 erasers with handling capacity of 14 eproms. UV141 has a built in timer. Both offer full built in safety features UV140 £61; UV141 £79(b).

SMARTMOUTH

The Original 'Infinite Speech' Synthesiser — Still the Best!
A ready-built totally self-contained speech synthesiser unit, attractively packaged with built in speaker, Aux. output socket etc. Optimum sound quality is achieved due to a tailored frequency response audio stage. It allows the creation of any English word with both ease and simplicity, while, at the same time, being very economical in memory usage. You can easily add speech to most existing programs. Due to its remarkable infinite vocabulary, its uses spread throughout the whole spectrum of computer applications — these include educational, industrial, scientific, recreational etc. — simply plugs into the User Port. No ROMs are needed. Smartmouth is supplied with demo and development programs on cassette (easily transferred to disc) and full instructions. £37(c).

'TIME-WARP' REAL-TIME CLOCK CALENDER

time-warp
real-time clock

A low-cost compact unit that opens up the total range of Real-Time applications, and adds a new dimension to the personal computer. Though built to exacting professional standards, it is at a price previously unattainable, and brings it within reach of all BBC Computer owners. With its full integral battery backup, possibilites include an Electronic Diary, continuous display of 'on-screen' time and date information, automatic document dating, precise timing and control in scientific applications, recreational use in games etc. — its uses are endless and are simply limited by ones imagination. Simply plugs into the User Port — no ROMs needed. Extensive applications software supplied on cassette (easily transferred to disc) and full instruction manual. Please phone for details. £29(c).

ATPL SIDEWISE ROM EXPANSION BOARD

This is a well constructed expansion board, that does not require soldering in its installation. All buses are buffered. It allows full sideways Rom expansion to a total of 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K byte CMOS RAM chips, giving a total of 16K sideways RAM. This is ideal for sideways rom development, and will also allow downloading of software from cassette or disc. The battery backup option will allow retention of data in the RAM, when power to the computer is removed. Several link-selectable options include the choice of type of Eprom, and a 'write-protect' for the RAM option. £39(d) Back-up Kit £18.

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Please add carriage: (a) £8; (b) £2.50 (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

ACORN IEEE INTERFACE

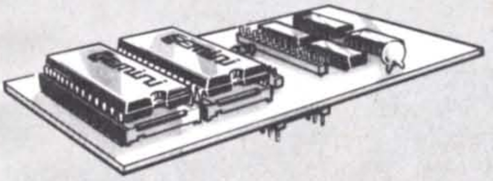
This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 separate IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £282(a)

ACORN TELETEXT INTERFACE

This interface allows the retrieval and storage of data transmitted by both BBC and IBA. There are currently many educational and other programs being transmitted, and this unit will allow their retrieval absolutely free. In 'Terminal' mode, the system receives and decodes pages from both Ceefax and Oracle. (These pages can be stored). In 'Telesoftware' mode, the system can load, run and execute programs that are transmitted. This unit gives you a professional teletext terminal at a cost effective price. £195(b)

DATABASE MANAGEMENT SYSTEM

Gemini DATAGEM



The Definitive Random Access, 24K ROM Based DATABASE MANAGEMENT SYSTEM.
Datagem is the first truly flexible database for the BBC Micro that can make your system really useful and efficient, saving you money in the long-run. The system includes a carrier board containing two Eproms, demonstration applications disc in both 40/80T, professional documentation with quick reference card, and 'Trans' utility program. Features include: *almost unlimited file size (max 10MByte) *supports up to 4 drives *Max of 5000 records per file *max 6K record size *max of 62 fields *9 level hierarchical search system with facilities to store results of searches. Searches can be any one of the following: Search, Include, Exclude, Combine, Common or Difference *user defined variables *generates form letters from records. Please ask for leaflet. £112(c).

FIRMWARE/SOFTWARE

VIEW Word Processor Rom on special offer at £48(c).
This is the new version V2.1. Advantages include being able to print straight from memory, as well as editing in any mode. Complete with comprehensive manuals to Acorns usual high standard.

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £52(c)

VIEW INDEX Disc based program which will create an index from any marked view text file and sorts alphabetically noting each page number or section where the reference occurs. Marking of the words or phrases can be done while writing the file or when editing it. An ideal utility for any one concerned with writing extensive reports, books etc. £13(d)

WORDWISE One of the most popular word processors for general use **£34(d).** Wordwise SpellCheck Disc — A must for any serious word processor user. Normal price £16.50(d). If bought with Wordwise: No p&p and only **£14.**

SPELLCHECK II (Rom based) A new machine code program that works with both VIEW and WORDWISE and operates up to 5 times faster than SPELLCHECK I. A dictionary disc is supplied with a vocabulary of 6000 words and the data compressing technique used in storing the words will ensure that this can be extended to well over 17000 words on a 100K disc. The rom is fully compatible with the 6502 2nd processor. £26(d)

NEW

ULTRACALC This new version of the successful spreadsheet program has several enhancements to increase its power and flexibility including: * Operation in any mode * Greater printer flexibility incl. control codes £ sign definition * runs as HICALC with 6502 second processor allowing 44K of space in any mode * Spooling as ASCII text files. These features are in addition to the existing powerful features such as handling of labels as well as numbers as values, allowing search by a meaningful name rather than just a number. Facilities and commands include: variable column width, sum, replicate, insert, delete, justify and most mathematical functions. You can create and manipulate pricelists, balance sheets, payroll, c/flow order entry, small databases and scientific calculations. £69(c)

VIEWSHEET Acorns spreadsheet provides 255 rows and 255 columns and will operate in any mode. It distinguishes between values, labels and formulae. Windows can be created which can then be arranged to provide any type of format required for printing. Function keys provide for easy entry of commands which include insert, delete, replicate, justify etc. Most mathematical functions supported. Printer commands can be given using the VIEW printer driver. Files can be converted to VIEW files and data transferred between different worksheets. £52(d)

QUICKCALC An economically priced disc based spreadsheet program for personal accounts etc. It offers load, save, print, goto, replicate, histogram and many other functions. £12.50(d) (please specify 40 or 80T)

BCPL A full implementation of the BCPL compiler language consisting of the language rom, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. BCPL can be used to develop games programs, commercial packages, system software, to write control systems and to produce programs which otherwise would need to be written in assembler. £52(b)

BCPL STAND ALONE GENERATOR Utilities in this package enable the programs developed using the BCPL rom to be converted so that they can be run on any BBC micro whether it has a BCPL rom or not. Stand alone programs for other 6502 based systems can also be developed. £43(d)

BCPL CALCULATIONS PACKAGE: supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calculation files, example files and a comprehensive user guide. £17.30(b)

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6502 DEVELOPMENT PACKAGE Write for details and availability £43(c)

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. It incorporates an editor, 6502 assembler, very fast turtle graphics and supports extensive string and file handling. It contains 540 predefined words including those for reading joystick ports, produce sounds, set and read the time and produce random numbers. Fully compatible with disc or tape filing systems and works in any mode. Package comes complete with a USER GUIDE, Introduction to FORTH and 16K GFORTH ROM £43(d)

DISC DOCTOR This general purpose ROM adds 20 commands to the DFS system. It includes a formatter, sector editor, tape-disc & disc-tape routines, a powerful disassembler, commands for listing function key definitions for editing etc. This ROM will obliviate the need to go for non standard DFS systems (with their inherent disadvantages) as it overcomes many of the Acorn DFS's shortcomings. £28(d)

DISCMASTER Beebug's utility rom for disc users adds 11 powerful utilities. Commands include Disc editor/string search, recover, movedown, Link, overlay, format 40/80. Other facilities include colourful disc menu to automatically RUN/*RUN programs, copy non protected cassettes to disc, convert 40 track discs to 80 track and enable dual catalogues. £16(d)

EXMON II Updated ROM version of the original EXMON with new facilities including dual screen operation and full screen memory editor adding 60 more commands on the BBC. Dual screen operation allows running or single stepping of a game or any other program and watching it on the screen or flipping to the monitor screen to examine the registers, edit code or alter memory etc by simple switching. £24(d)

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GRAPHICS ROM This Rom includes over 28 new graphics related commands which can be used in BASIC programs. Features include: sprites, LOGO Turtle graphics, fill routines, shading, large characters, rotation, scaling and 3D plotting all using '*' commands. 28(d)

BASIC COMPILER Write for details and availability.

PRINTMASTER This ROM features the most versatile screen dump for EPSON MX/RX/FX80 and Kaga 810 printers. It supports three types of dumps. The first allows any graphics on the screen to be dumped. Colours appear as shades of grey. Any part of the screen can be printed at any position on the paper in any one of four orientations. The screen dump may be magnified by any factor x2, x3, x4 etc. A special feature allows true MODE 7 screen dumps with TELETEXT text & graphics. The second dump allows any text to be dumped whilst the third dump will print the contents of a file on disc whilst the computer is doing other things. This is not all. All printer functions can be called up using the *command. *DEFINE allows the printer to define his own characters and store them. *GPRINT allows printing of enlarged text in any position, orientation, size & shade. *WINDOW allows windows to be defined in any size and position on the screen. **In short this one ROM does it all.** £28(d)

DUMPMASTER A sophisticated piece of software that produces fast, machine code, tailor made screen dumps for printers listed. It uses up to 8 shades and will copy accurately your screen in any graphics mode including the teletext mode. Once created, the routine can be called as required or appended to any Basic program. Snapshot facility allows screen dumps from a game or other program using single key as long a work areas do not clash. Printers are EPSON MX/FX, STAR 910, Seikosha GP80, 100, 250, 700, NEC PC8023, FACIT 4510 (linear), ANADEX DP9500A and 9501A and INTEGREX Colourjet 132A £10(d))

MUROM Sound Extension Rom: Helps you create your own tunes and sound sequences either with MUROM's editor and a musical score or using the keyboard to simulate a piano. Edit your creations with the full screen music editor and then switch to envelope editor to tailor the tonal quality and select instrument type. Incorporate the music into other programs or playback with or without MUROM. Instant sound effects can be called from Basic eg *ZAP, *SIREN, *EXPLODE etc. £24.50(d)

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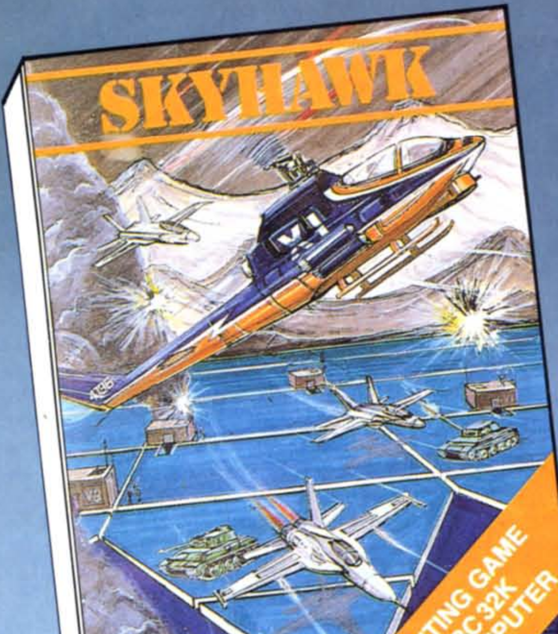
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> "... the BBC Micro is, in my opinion, a machine that will be with us when others have decayed back to the sand that their silicon chips came from!"
>
> – from the preface to "The BBC Micro, an expert guide" by Mike James.

DAVE was in his bedroom, programming. His friends ridiculed the fact that he used a computer that was now several decades old, but he ignored them. What if it didn't have two-way interactive speech, or even a speech synthesiser? What if it did have an old-fashioned keyboard, with the even more old-fashioned QWERTY layout? The point was, he UNDERSTOOD it.

His BBC Micro had belonged to his father when he had been a small boy. Dave, like every other kid, had played with modern picocomputers, from wrist-watch size, which you held up to your mouth to speak into, to the ultra-sophisticated, about the size of his BBC model, but he thought of them as inscrutable boxes.

None of his friends knew how their computers worked; it was not necessary to learn even a high level language any more to program them. You simply had to talk to them, and they answered you.

His BBC Micro, on the other hand, was much simpler and easier to understand. He had his father's old literature, including the User Guide and Advanced User Guide, both well-thumbed with the rear pages long since free of the spiral binding with so much use.

He knew that the computer used serial processing, having in fact been manufactured shortly before the invention of the very first transputers which totally revolutionised computing.

He knew also that, although it had provision for a so-called "High-Level" language, he could instruct it in something even simpler; by using machine code, he could give instructions directly to the central processor.

He enjoyed playing with machine code, in much the same way as some adults still enjoyed running and maintaining old stream locomotives. Right now, he was entering a short program that he had dreamed up:

```
 10 DIM CODE% 12
 20 P%=CODE%
 30 [OPT 0
 40 SEI
 50 .LP1 LDX#0
 60 .LP2 INC &7C00,X
 80 BNE LP1
 90 INX
100 JMP LP2
110 ]
120 MODE 7
130 CALL CODE%
```

He had just finished entering the program and starting to RUN it, when his mother called, "Dave! Please come down here at once".

He left his computer running and hurried downstairs. His parents looked grim and a little frightened.

"There's just been a news flash", said his father. "A couple of nuclear missiles have been used in the war, and they're afraid that the all-out exchange could start at any time. I think the best thing for us to do would be to go down to the cellar, and hope we'll be safer there".

They descended to the cellar, which Dave's parents had stocked with several months' supply of food shortly after the war had started in case this moment came. As they did so, a distant siren started to wail, Up above, Dave's computer continued to run its program.

One of the interesting things about Dave's computer was its power supply. With the frequent power interruptions caused by the requirement to divert energy resources for military purposes, some kind of battery backup was essential, particularly for a computer that was so old that it had a volatile memory.

Dave had obtained a small solar power supply with battery backup, and had it mounted on top of the computer, just inside his bedroom window. The solar cells and battery together were capable of running the computer indefinitely, given daily boosters of sunlight.

Another siren started, closer this time. Anybody who was in the open was trying to make for some sort of shelter, whether invited or not. In their cellar, Dave and his parents waited.

Then the sky seemed to explode.

The direction of the flash was such that, although it hit Dave's bedroom window, the computer and its solar power supply were shielded by the walls. The window was made from a new type of crystal plastiglass, which was thought to be shatter-proof and virtually indestructable. The word 'virtually', however, did not include the effects of heat from a one megaton nuclear bomb.

The window did not shatter; it simply turned to molten crystal, fell in, completely enveloping the computer and power unit, and quickly solidified again. When the blast came it severely damaged the house, but the crystal globule that had been Dave's bedroom window did not crack. No one ever emerged from the cellar.

As if by a miracle, Dave's BBC Micro and its solar power unit had been spared. The TV set and various other peripherals had been blown away, but, enclosed in its ball of clear crystal, the computer still functioned, powered by the daylight to which it lay exposed, still executing the program which Dave had entered into it . . .

Report on scientific investigation of third planet

Our earlier expedition had found relics of an ancient, extinct civilisation on this planet, so we were keen to investigate further. We cannot know what catastrophe overtook the race, but there is a certain amount of lingering radiation.

Fragments of many artifacts, such as buildings, remain, but nothing sufficiently detailed was found to give any clue as to the nature of the people, or how long ago the catastrophe occurred, until we made a most amazing discovery which gave valuable information on both these matters.

One of our search parties found a lump of material which appeared to be a kind of crystaline plastic of a particularly resilient nature. Some of our communications equipment which operates at a particularly low frequency experienced interference in the vicinity of this artifact, and we realised that the lump contained a kind of electronic machine which was still operating!

We did not wish to risk interfering with the machine's functioning by breaking open the crystal, so we subjected the device to a detailed electronic scanning probe. It appeared to be a kind of electronic counting or calculating machine.

We were not surprised to discover that the circuitry operated using binary numbers; such a system is after all, the most basic possible counting system, and is used throughout the universe. We were intrigued, however, to see that the number storage circuits were arranged in groups of 8 binary bits.

This fact led us to speculate that the people who made this machine used a numbering system based on either 8 or 16. An examination of the machine's controls suggests that its operator must have had two hands with eight fingers each, or four hands with four fingers, or perhaps the machine was intended to be operated with one hand with 16 fingers.

This solitary clue as to the nature of

TIME =eternity

By MARTYN FOX

the people was very interesting, but paled into insignificance following the shock we had when we discovered what the machine was doing. Part of the number-storage circuitry appeared to have been arranged as a counter with a very large number of digits potentially 256.

The lowest-order digits were counting quite fast, but the number that the count had reached was so large that we calculate that, assuming that it had been started from zero, it had been counting for several thousands of this planet's years!

Incidentally, the designers of this machine, for reasons best known to themselves, had set all of the unused digits to 32, instead of zero, and we took this into account.

Naturally, one of our team raised the point that the counter could have gone right round several times since it started, but we were able to discount this, as the total period of the counter must be many times greater than the age of the universe, let alone this planet.

Although the investigation of this machine has furthered our research as described, we are completely unable to understand its purpose. Why would anyone want to build such a large counter?

The time that a full count would take is unimaginably long; in fact, we think that the universe will have ceased to exist before it gets even half-way. The maximum number, expressed in binary, would be 1, followed by 2048 zeros – surely, to us, a number with no practical use.

We can only speculate as we continue to probe the machine. A great deal of it appears to be unused, and it obviously has a great many more secrets to tell us. I intend, after a thorough examination, to write a book on it, a kind of User Guide.

Emergency addendum

We have, unfortunately, interfered with the workings of this machine. As you know, our electronic scanning probes work best in darkness. We therefore put the machine in a darkened area of our landing craft to investigate it.

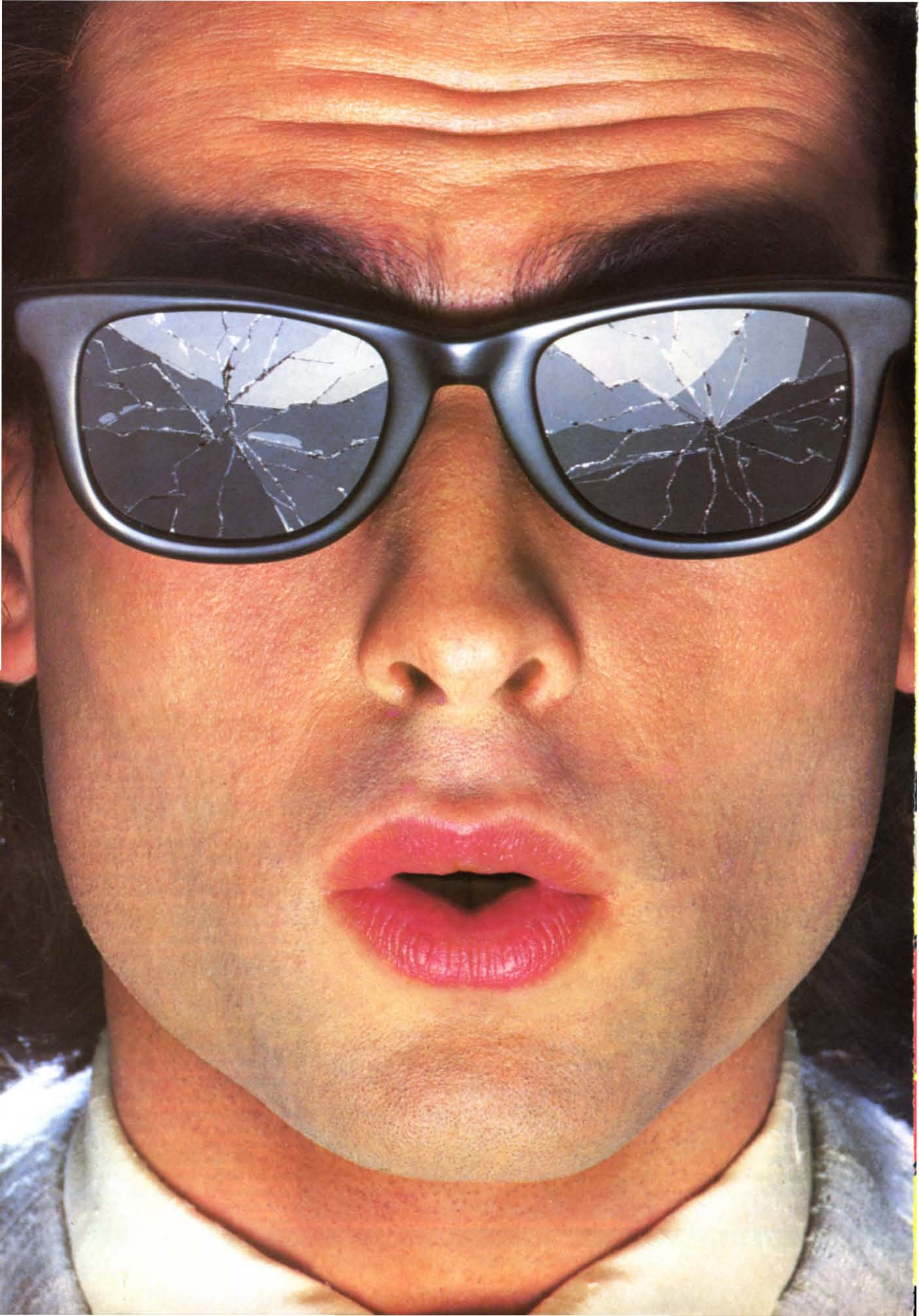
After several planet cycles inside the craft all electronic activity stopped.

We realised too late that this machine had been powered by daylight. We quickly took it out into the light, whereupon it emitted a short, high-pitched sound. Although electronic activity of some sort resumed, the counting process, which had been of such interest to us earlier, was absent, and we have found no way to restart it.

We have, however, made another startling discovery. Following this calamity, we decided that we had nothing to lose by opening the machine up. On cleaning away a certain amount of dirt, we discovered what we believe to be a picture of one of the people who used to inhabit this planet.

They had rectangular heads, with two large eyes, and a body somewhat smaller than the head, ending in two feet, each of which appears to have had three toes. A third limb of some sort appears to have been used to help support the large head.

How they operated the machine is not clear, but we feel that this find has been a real quantum leap in our understanding of this planet.



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Kendal. The Kendal Computer Centre, Stramongate. Tel: 0539 22559.

Whitehaven. PD Hendren, 15 King Street. Tel: 0946 2063.

Workington. Technology Store, 12 Finkle Street. Tel: 0900 66972.

DERBYSHIRE

Alfreton. Gordon Harwood, 69-71 High Street. Tel: 0773 836781.

Chesterfield. Boots, 35-37 Low Pavement, Market Place. Tel: 0246 203591.

Chesterfield. Computer Stores, 14 Stephenson Place. Tel: 0246 208802.

DEVON

Exeter. Boots, 251 High Street. Tel: 0392 32244.

Exeter. Open Channel, Central Station, Queen Street. Tel: 0392 218187.

Plymouth. Syntax, 76 Cornwall Street. Tel: 0752 28705.

Seaton. Curtis Computer Services, Seaton Computer Shop, 51c Harbour Road. Tel: 0297 22347.

Tiverton. Actron Microcomputers, 37 Bampton Street. Tel: 0884 252854.

DORSET

Bournemouth. Brook Computers, 370 Charminster Road. Tel: 0202 533054.

Bournemouth. Lansdowne Computer Centre, 1 Lansdowne Crescent, Lansdowne. Tel: 0202 20165.

Dorchester. The Paper Shop, Kings Road. Tel: 0305 64564.

ESSEX

Chelmsford. Maxton Hayman, 5 Broomfield Road. Tel: 0245 354595.

Colchester. Boots, 5-6 Lion Walk. Tel: 0206 577303.

Grays. H Reynolds, 28a Southend Road. Tel: 0375 31641.

Harlow. Laskys, 19 The Harvey Centre. Tel: 0279 443495.

Hornchurch. Comptel Computer Systems, 112a North Street. Tel: 0402 446741.

Ilford. Boots, 177-185 High Road. Tel: 01-553 2116.

Southend-on-Sea. Computerama, 88 London Road. Tel: 0702 335443.

Southend-on-Sea. Computer Centre, 336 London Road. Tel: 0702 337161.

Southend-on-Sea. Estuary Personal Computers, 318 Chartwell North, Victoria Circus Shopping Centre. Tel: 0702 614131.

GLOUCESTER

Cheltenham. Laskys, 206 High Street. Tel: 0242 570282.

Cheltenham. Screen Scene, 144 St Georges Road. Tel: 0242 528979.

Gloucester. Boots, 38-46 Eastgate Street. Tel: 0452 423501.

HAMPSHIRE

Basingstoke. Fishers, 2-3 Market Place. Tel: 0256 22079.

Southampton. Business Electronics, Micromagic At Atkins, 7 Civic Centre Road. Tel: 0703 25903.

Southampton. Tyrrell & Green, Above Bar. Tel: 0703 27711.

HERTFORD

Hitchin. County Computers, 13 Bucklesbury. Tel: 0462 36757.

Hitchin. GK Photographic & Computers, 68 Hermitage Road. Tel: 0462 59285.

Potters Bar. The Computer Shop, 197 High Street. Tel: 0707 44417.

Stevenage. DJ Computers, 11 Town Square. Tel: 0438 65501.

Watford. Laskys, 18 Charter Place. Tel: 0923 31905.

Watford. SRS Microsystems, 94 The Parade, High Street. Tel: 0923 26602.

Watford. Trewins, Queens Road. Tel: 0923 44266.

Welwyn Garden City. DJ Computers, 40 Fretherne Road. Tel: 96 28444.

Welwyn Garden City. Welwyn Department Store. Tel: 0707 323456.

HUMBERSIDE

Beverley. Computing World, 10 Swabys Yard, Dyer Lane. Tel: 0482 881831.

KENT

Beckenham. Supa Computers, 425 Croydon Road. Tel: 01-650 3569.

Bexleyheath. Laskys, 15-16 Broadway Shopping Centre. Tel: 01-301 3478.

Bromley. Boots, 148-154 High Street. Tel: 01-460 6688.

Bromley. Computers Today, 31 Market Square. Tel: 01-290 5652.

Bromley. Laskys, 22 Market Square. Tel: 01-464 7829.

Bromley. Walters Computers, Army & Navy, 64 High Street. Tel: 01-460 9991.

Chatham. Boots, 30-34 Wilmott Square, Pentagon Centre. Tel: 0634 405471.

Sevenoaks. Ernest Fielder Computers, Dorset Street. Tel: 0732 456800.

Sittingbourne. Computer Plus, 65 High Street. Tel: 0795 25677.

Tunbridge Wells. Modata Computer Centre, 28-30 St Johns Road. Tel: 0892 41555.

LANCASHIRE

Blackburn. Tempo Computers, 9 Railway Road. Tel: 0254 691333.

Blackpool. Blackpool Computer Store, 179 Church Street. Tel: 0253 20239.

Burnley. IMO Business Systems, 39-43 Standish Street. Tel: 0282 54299.

Preston. 4Mat Computing, 67 Friargate. Tel: 0772 561952.

Preston. Laskys, 1-4 Guildhall Arcade. Tel: 0772 24558.

Wigan. Wildings Computer Centre, 11 Mesnes Street. Tel: 0942 44382.

LEICESTERSHIRE

Leicester. Boots, 30-36 Gallowtree Gate. Tel: 0533 21641.

Market Harborough. Harborough Home Computers, 7 Church Street. Tel: 0858 63056.

LONDON

W1. Computers of Wigmore Street, 104 Wigmore Street. Tel: 01-486 0373.

W1. HMV, 363 Oxford Street. Tel: 01-629 1240.

W1. John Lewis, Oxford Street. Tel: 01-629 7711.

W1. Laskys, 42 Tottenham Court Road. Tel: 01-636 0845.

W1. Lion House, 227 Tottenham Court Road. Tel: 01-637 1601.

W1. Rother Cameras, 256 Tottenham Court Road. Tel: 01-580 5826.

W1. The Video Shop, 18 Tottenham Court Road. Tel: 01-580 5380.

W1. Walters Computers, DH Evans, Oxford Street. Tel: 01-629 8800.

WC1. Transam Micro Systems, 59-61 Theobalds Road. Tel: 01-405 5240.

W5. Laskys, 18-19 Ealing Broadway Shopping Centre. Tel: 01-567 4717.

W8. Walters Computers, Barkers, Kensington High Street. Tel: 01-937 5432.

SW1. Peter Jones, Sloane Square. Tel: 01-730 3434.

SE9. Square Deal, 373-375 Footscray Road, New Eltham. Tel: 01-859 1516.

Lewisham. Laskys, 164 High Street. Tel: 01-852 1375.

SE13. Walters Computers, Army & Navy, 33 and 63 High Street, Lewisham. Tel: 01-852 4321.

SE15. Castlehurst Ltd, 152 Rye Lane, Peckham. Tel: 01-639 2205.

EC2. Devron Computer Centre, 155 Moorgate. Tel: 01-638 3339.

N7. Jones Brothers, Holloway Road. Tel: 01-607 2727.

N14. Logic Sales, 19 The Bourne, The Broadway, Southgate. Tel: 01-882 4942.

NW3. Maycraft Micros, 58 Rosslyn Hill, Hampstead. Tel: 01-431 1300.

NW4. Davinci Computer Store, 112 Brent Street, Hendon. Tel: 01-202 2272.

NW7. Computers Inc, 86 Golders Green. Tel: 01-209 0401.

NW10. Technomatic, 17 Burnley Road, Wembley. Tel: 01-208 1177.

MANCHESTER

Manchester. Boots, 32 Market Street. Tel: 061-832 6533.

Manchester. Laskys, 61 Arndale Centre. Tel: 061-833 9149.

Manchester. Laskys, 12-14 St Marys Gate. Tel: 061-833 0268.

Manchester. Mighty Micro, Sherwood Centre, 268 Wilmslow Road, Fallowfield. Tel: 061-224 8117.

Manchester. NSC Computer Shops, 29 Hanging Ditch. Tel: 061-832 2269.

Oldham. Home & Business Computers, 54 Yorkshire Street. Tel: 061-633 1608.

Swinton. Mr Micro, 69 Partington Lane. Tel: 061-728 2282.

MERSEYSIDE

Heswall. Thornguard Computer Systems, 46 Pensby Road. Tel: 051-342 7516.

Liverpool. George Henry Lee, Basnett Street. Tel: 051-709 7070.

Liverpool. Hargreaves, 31-37 Warbreck Moor, Walton. Tel: 051-525 1782.

Liverpool. Laskys, Dale Street. Tel: 051-236 3298.

Liverpool. Laskys, St Johns Precinct. Tel: 051-708 5871.

St Helens. Microman Computers, Rainford Industrial Estate, Mill Lane, Rainford. Tel: 0744 885242.

Southport. Central Studios, 38 Eastbank Street. Tel: 0704 31881.

MIDDLESEX

Enfield. Laskys, 44-48 Palace Garden Shopping Centre. Tel: 01-363 6627.

Harrow. Camera Arts, 42 St Anns Road. Tel: 01-427 5469.

Hounslow. Boots, 193-199 High Street. Tel: 01-570 0156.

Teddington. Andrews, Broad Street. Tel: 01-977 4716.

Twickenham. Twickenham Computer Centre, 72 Heath Road. Tel: 01-892 7896.

Uxbridge. JKL Computers, 7 Windsor Street. Tel: 0895 51815.

NORFOLK

Norwich. Bonds, All Saints Green. Tel: 0603 24617.

NOTTINGHAMSHIRE

Sutton in Ashfield. H N & L Fisher, 87 Outram Street. Tel: 0623 54734.

Nottingham. Jessops, Victoria Centre. Tel: 0602 418282.

Nottingham. Laskys, 1-4 Smithy Row. Tel: 0602 413049.

OXFORDSHIRE

Abingdon. Ivor Fields Computers, 21 Stert Street. Tel: 0235 21207.

Banbury. Computer Plus, 2 Church Lane. Tel: 0295 55890.

Oxford. Science Studio, 7 Little Clarenden Street. Tel: 0865 54022.

SCOTLAND

Edinburgh. Boots, 101-103 Princes Street. Tel: 031-225 8331.

Edinburgh. John Lewis, St James Centre. Tel: 031-556 9121.

Edinburgh. Laskys, 4 St James Centre. Tel: 031-556 1864.

Glasgow. Boots, 200 Sauchiehall Street. Tel: 041-332 1925.

Glasgow. Boots, Union Street and Argyle Street. Tel: 041-248 7387.

SHROPSHIRE

Telford. Telford Electronics, 38 Mall 4. Tel: 0952 504911.

STAFFORDSHIRE

Newcastle-under-Lyme. Computer Cabin, 24 The Parade, Silverdale. Tel: 0782 636911.

Stafford. Computerama, 59 Foregate Street. Tel: 0785 41899.

Stoke-on-Trent. Computerama 11 Market Square Arcade, Hanley. Tel: 0782 268524.

SUFFOLK

Bury St Edmunds. Boots, 11-13 Cornhill. Tel: 0284 701516.

Ipswich. Brainwave Micros, 24 Crown Street. Tel: 047 350965.

SURREY

Croydon. Laskys 77-81 North End. Tel: 01-681 8443.

Croydon. The Vision Store, 96-98 North End. Tel: 01-681 7539.

South Croydon. Concise Computer Consultants, 1 Carlton Road. Tel: 01-681 6842.

Epsom. The Micro Workshop, 12 Station Approach. Tel: 0372 721533.

Guildford. Walters Computers, Army & Navy, 105-111 High Street. Tel: 0483 68171.

Haslemere. Haslemere Computers, 17 Lower Street. Tel: 0428 54428.

Wallington. Surrey Micro Systems, 53 Woodcote Road. Tel: 01-647 5636.

Woking. Harpers, 71-73 Commercial Way. Tel: 0486 225657.

SUSSEX

Bexhill-on-Sea. Computerware, 22 St Leonards Road. Tel: 0424 223340.

Brighton. Boots, 129 North Street. Tel: 0273 27088.

Brighton. Gamer, 71 East Street. Tel: 0273 728681.

Brighton. Laskys, 151-152 Western Road. Tel: 0273 725625.

Crawley. Gatwick Computers, 62 The Boulevard. Tel: 0293 37842.

Crawley. Laskys, 6-8 Queensway. Tel: 0293 544622.

TYNE & WEAR

Newcastle-upon-Tyne. Bainbridge, Eldon Square. Tel: 0632 325000.

Newcastle-upon-Tyne. Boots, Eldon Square. Tel: 0632 329844.

Newcastle-upon-Tyne. Laskys, 6 Northumberland Street. Tel: 0632 617224.

Newcastle-upon-Tyne. RE Computing, 12 Jesmond Road. Tel: 0632 815580.

WALES

Aberdare. Inkey Computer Services, 70 Mill Street, The Square, Trecynon. Tel: 0685 881828.

Aberystwyth. Aberdata at Galloways, 23 Pier Street. Tel: 0970 615522.

Cardiff. Boots, 26 Queens Street & 105 Frederick Street. Tel: 0222 31291.

Cardiff. P & P Computers, 41 The Hayes. Tel: 0222 26666.

Swansea. Boots, 17 St Marys Arcade, The Quadrant Shopping Centre. Tel: 0792 43461.

WARWICKSHIRE

Coventry. Coventry Micro Centre, 33 Far Gosford Street. Tel: 0203 58942.

Coventry. JBC Micro Services, 200 Earlsdon Avenue, North Earlsdon. Tel: 0203 73813.

Coventry. Laskys, Lower Precinct. Tel: 0203 27712.

Leamington Spa. IC Computers, 43 Russell Street. Tel: 0926 36244.

Leamington Spa. Leamington Hobby Centre, 121 Regent Street. Tel: 0926 29211.

Nuneaton. Micro City, 1a Queens Road. Tel: 0203 382049.

Rugby. OEM Computer Systems, 9-11 Regent Street. Tel: 0788 70522.

WEST MIDLANDS

Birmingham. Boots, City Centre House, 16-17 New Street. Tel: 021-643 7582.

Birmingham. Laskys, 19-21 Corporation Street. Tel: 021-632 6303.

Dudley. Central Computers, 35 Churchill Precinct. Tel: 0384 238169.

Stourbridge. Walters Computer Systems, 12 Hagley Road. Tel: 0384 370811.

Walsall. New Horizon, 1 Goodall Street. Tel: 0922 24821.

West Bromwich. D S Peakman, 7 Queens Square. Tel: 021-525 7910.

Wolverhampton. Laskys, 2 Wulfrum Square. Tel: 0902 714568.

YORKSHIRE

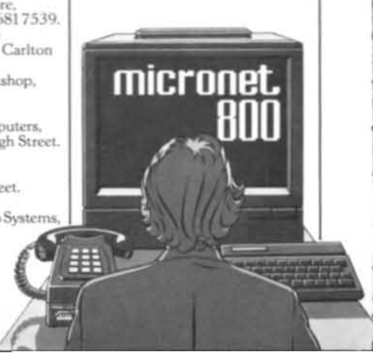
Bradford. Boots, 11 Darley Street. Tel: 0274 390891.

Leeds. Boots, 19 Albion Arcade, Bond Street Centre. Tel: 0532 33551.

Sheffield. Cole Brothers, Barkers Pool. Tel: 0742 78511.

Sheffield. Laskys, 58 Leopold Street. Tel: 0742 750971.

York. York Computer Centre, 7 Stonegate Arcade. Tel: 0904 641862.



Graphically great, but sounds unexciting

3D
Grand Prix
BBC Micro
Model B
SOFTWARE INVASION

3D Grand Prix – the latest release from Software Invasion – gives you another chance to stand in awe of the 3D shrink-and-grow routines so beloved of its makers.

The screen display is similar to that of the arcade original, Pole Position, with the road weaving around in front of you. You can also see your spinning tyres, and a panel display of the ever-erratic rev counter, speedometer, temperature, gear selected and the steering wheel.

The other cars in the race make life as difficult as possible as a matter of course (sorry about the pun). Unlike its arcadian uncle, 3D Grand Prix requires you to finish in the first four in each race in order to compete in the next race at one of eight different tracks.

Fail to qualify and one could say that it's the end of the road . . .

The most difficult thing about the game is trying to overtake a car in front – you either seem to end up chewing a bill board or you pile into your rival.

If you wait patiently behind it will eventually move across and let you pass provided you are ready to go rather smartly.

It's a fair game – better than most yet worse than some – with impressive graphics.

The lone car visible in front gets bigger and smaller in jerks, though the impression of movement is rather good. The mountains in the background move when you turn which is a nice touch.

The engine noise is OK but it seems a bit 'whizzy' instead of 'growly'. The real clanger is at high speeds though. A strange fluttering noise drifts from the speaker. No, it doesn't resemble a skid – it's a cross between that and the tyres saying their fond farewells to the wheels.

The controls are well thought out, though pre-defined. Joysticks are optional and again easy to control.

To sum up, it would sell excellently with its graphics but its sound effects and fellow competitors spoil it for me.

Philip Tudor

Taking the serious view . . .

SUPPLIED as a book and cassette suite, **Data Structure Demo** is aimed at those who want to use the BBC Micro for serious purposes, especially in data processing.

It takes the concept of data structures apart and then shows how you can use the various ideas involved to develop your own data handling programs.

The main headings are arrays, hash tables, linked lists and binary trees – a reasonable way to break down the subject matter.

Unlike many packages of this type the book is not simply a listing of the programs but serves a dual purpose by documenting them, teaching the concept involved by example and theory.

The theory takes you step by step from the problem towards the solution in a lively and imaginative way.

This is then followed by a section about the programs on the cassette with listings of short sections of the code where and when they are needed.

Next is a list of suggested data

Relive carnage of the Somme

ATTACK on The Somme is another thought provoking educational package from Tressell Publications.

"Package" is the correct term for their work as the programs are carefully integrated with the documents and together they provide an in-depth study.

In the package are a user guide, teachers' notes, two booklets (The Somme 1914-18 and Contemporary Accounts of the First World War), and the two programs.

As with other written materials produced by this teachers' cooperative, they are well designed and printed.

The two programs consist of an introduction made up of six sub-programs, and the main attack. In general these work very well despite some colour combinations that are not impressive on an ordinary colour television.

The introduction sets the various scenes and uses effective, if not particularly sophisticated, animation to illustrate such things as air and ground observation, creeping barrage, and the trenches.

Throughout, the students are encouraged to cross reference the booklets, answer questions and comment on observations. It is most instructive for students to see animations of the strategies as this allows them to see more clearly the implications of the decisions made.

All this leads up to the battle itself. Thankfully this is not of the "zap 'em as fast as you can" type but allows a battle plan to be laid out and followed through to its conclusion.

Decisions have to be taken about five things – the preliminary bombardment, mines, infantry, when to attack and how to attack.

A map of the battle area is used to assist decisions and reports are given at different stages.

At the conclusion of the battle a set of detailed comments and criticisms are given on the performance and a comparison made with Haig's plan.

Overall this is a very effective and sympathetic attempt to deal with this complex and emotional event. The authors have attained a high degree of realism and have certainly added another very useful learning aid for historians to use.

Norman Parr

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designed to show how the program can handle specific problems.

Technical documentation follows, if required, and gives a full explanation of the essential parts of the program code, relating these to the theory already explained.

Each section ends with a set of suggested exercises, a way of testing that you have really understood the area thoroughly. Answers are provided in an appendix in case you get lost or confused.

There is no doubt that this is a well written and conceived package which will appeal to those who have to study data structures or have to teach the subject using the BBC Micro.

I think the programs in particular will appeal to lecturers and teachers due to their well structured design. This uses the features of BBC Basic that so many other serious application packages ignore.

I can't see this being number one in the charts however – there isn't a single Space Invader in sight.

Dave Carlos

Martians muscle in

In **Spaceman Sid** the Martians have muscled in on our mining operations on the Planet Tribos. With only your XR5 laser-armed combat rover for protection you must infiltrate the Martian defences and destroy the enemy camps.

SPACEMAN SID
BBC MODEL B
ENGLISH SOFTWARE

The constantly scrolling planet surface is far from smooth, yet the combat rover's excellent independent suspension copes admirably with the rugged terrain.

However the craters must be jumped by pressing Shift and the larger rocks vapourised with a blast from your forward laser cannon.

The results of failing to clear a crater are quite devastating as all three wheels fly gracefully skywards and bounce away in different directions leaving the combat rover sat squarely on the ground.

The XR5's weaponry consists of two lasers, one firing forward and the other vertically upwards. The vertical firing laser is designed for shooting down the enemy scout ships which hover overhead dropping rather large

QUICK RUNS

A first look at some of the latest releases

Acid Drops: *Control your laser base in an attempt to destroy the moths, pods and spinners. Avoid at all costs the homing missiles, and the acid as it starts to drip from the bath overhead. Once in flight mode you must guide your craft through the maze to the next level.* (Firebird)

* * *

Bird Strike: *Shoot the attacking planes as they home in on you dropping bombs. A dead centre hit will destroy them but winging only releases a carrier pigeon. Shoot the pigeon to add a note to the stave at the top of the screen. Complete the tune for a bonus and the next level.* (Firebird)

* * *

Duck: *Aid Farmer Tubby to pot as many ducks and swans as you can without getting splattered with eggs. Take care that you don't trip over the birds that walk on at inopportune moments. Each wave gets more difficult and if the eggs hatch your problems will get worse.* (Firebird)

* * *

Gold Digger: *Collect the gold nuggets and crush the chasing misers. Take cover under the falling rocks as each of the six misers tries a different approach spinning hard to shake off.* (Firebird)

* * *

Number Painter: *In this educational package aimed at the 5-14 year age group you control a little man in a ladders and levels scenario. After selecting a speed, you must match a target number by painting a series of positive and negative numbers placed at random on the screen.* (Applied Systems)

* * *

Making Numbers Make Sense 1,2,3: *A suite of three pairs of educational programs on the subject of number estimation. Each looks at numbers in a different context and is designed to practise addition, subtraction and the concepts of 'more than' and 'less than'. Pack 1: Butterflies (Items) and Putting (Length). Pack 2: Time-flies (Time) and Tanker (Angle). Pack 3: Tiles (Area) and Fence (Perimeter).* (Hodder and Stoughton)

* * *

Warp 1: *As commander of a federation starship your mission is to search strange new galaxies for a fellow captain lost in space. Full colour on board screen graphics put you in full control to access six quadrants each with 48 sectors. You must overcome endless enemy onslaughts and master space station docking procedures.* (Icon)

* * *

Making Ends Meet: *An educational package aimed at school leavers designed to promote thought about money and budgets. The user makes decisions about accommodation, transport, social life and holidays with a view to making a wage packet go as far as possible.* (Cambridge)

* * *

1914: *A historical simulation for 15-18 year olds covering the first six weeks of World War 1. Students explore the consequences of their own military decisions based on information likely to have been available at that time.* (Cambridge)

* * *

Maths Topics 2: *This two-program pack for 11-14 year olds covers decimals, percentage and fractions. Percentage Families, an interactive learning program, is coupled with Percentage Snap. The latter is a rewarding game which aims to consolidate the knowledge gained from the former.* (Cambridge)

* * *

Sea Cliff Erosion: *This educational program aimed at the 13-16 age bracket is a simulation of the formation of sea cliffs. It allows the user to control the major determinants – wave action, weathering rates and rock types – to assess the relationship between these and cliff profile.* (Cambridge)

* * *

Chess Analysis System: *Allows you to enter, replay, save and load games. Within memory limitations any number of variations, at any depth, and any number of games can be restored within a single file. An index of games in the file is automatically generated, and moves and comments can be added or deleted from a game which is being replayed.* (Compuchess)

* * *

Jump Challenge: *Get the feel for bike jumping in this simulation of Eddie Kidd's* bombs in your general direction.

So that you don't present a sitting target for the enemy bombs, you are able to manoeuvre your craft backwards and forwards on the screen by use of the Z and X keys.

The forward laser is essential to enable Sid to destroy the rocks which litter the landscape and block his path.

Small rocks are destroyed by a single shot but the larger ones must be hit twice. Another hazard at ground level is the occasional enemy drone ship which skims over the surface at high speed in an attempt to ram your ship kamikaze-style.

The planet's surface is divided into five sectors, each consisting of five sub-sectors. Your position in each sector is shown graphically at the top of the screen.

Spaceman Sid is essentially the same game as Micro Power's Dune Rider but is played at a more leisurely pace – at the beginning anyway – and there are fewer aerial aliens.

Personally I found Sid more pleasing graphically, and much more addictive.

Jon Revis

The road to ruin?

RUIN
Acme Insurance Compa
Road User INsurance
A business game for 1-30 players

RUIN is suitable for early teenagers upwards and although produced as a road safety orientated game by Nottinghamshire County Council Road Safety Group, the road safety angle is very tenuous and I am not convinced that anyone playing the game would become any more safety conscious.

Having said that, it is a good business simulation, easy to understand and good value.

Up to six groups can be accommodated or one group can play against the micro which means that it is possible to use it for a full class.

However, unless the groups have access to individual machines which allow interaction with a central processor, pupils could become restless while waiting their turn to input their deliberations.

Each group acts as an insurance company quoting premiums for motor vehicle insurance. The game proceeds for up to 10 years.

Each year, five clients along with details such as age, type of vehicle, experience and number of miles per year, are offered and

→

achievements. Only by developing control and timing will you progress to the more difficult jumps. If you have the courage to push yourself to the limits you can become the best there is. When a successful jump qualifies for the 'Jump Challenge' competition the game is automatically interrupted and the details can be saved to tape for a chance to win a BMX bike, MSX micro or a colour TV. (Martech)

* * *

The Secret River: *In this text-only adventure, you first create your own character, select weapons, armour and spells, using the generator on side one of the cassette. After loading this into the adventure itself your task is to locate and drink from a magical green river situated in deep underground caves, rumoured to be heavily guarded by Trolls.* (Triffid)

* * *

The Wizard's Citadel: *Load your successful character from Secret River into this second text-only adventure. You have been approached by an unsavoury character by the name of Grunk the Elder. He has found a map of the Wizard's Citadel. Your task is to join him in his venture and face the hidden dangers together.* (Triffid)

* * *

Here and There with the Mr Men: *Four fun educational games aimed at 4-8 year olds and designed to teach direction and route planning. Mr Tickle's Jigsaw: Use the arrow keys to move the pieces into position. Mr Tickle and Mr Grumpy: Route planning using absolute directions left and right as you try to tickle Mr Grumpy. Mr Lazy: route planning using relative directions as you guide the lazy worm up a tree. Mr Men v Mr Tickle: Plan the movement of four Mr Men on a chess board to trap Mr Tickle. Absolute or relative direction options.* (Mirrorsoft)

* * *

Mr Ee: *You control the wily wizard as he tunnels through the earth collecting cherries. He is pursued by a band of Umphs and can destroy them by bouncing his crystal ball around the screen. Alternatively he can tunnel under, or push an apple to drop it on his pursuers. Bonus points can be achieved by running over food, and a bonus life is awarded for killing the five Letter Monsters.* (Micropower)

* * *

Roadcraft: *A graphic educational pack for 5-9 year olds designed to teach road safety. The child is asked the safest way to cross three separate roads without getting run over.* (Highlight)

* * *

Bert Boot: *In this educational package designed for the 8-12 year age group, the child is tested on multiplication and division. Correct answers are rewarded with an entertaining little arcade game.* (Highlight)

* * *

Penpal: *A light pen program to help you enjoy colour and shape through interaction with the screen. With the package you can draw with lines or dots, paint with keyboard and user-defined shapes, position text and shapes anywhere on screen, select any colours in Mode 2, plot mosaics, fill regular and irregular shapes, and save/load screens.* (Watford)

* * *

Computers, Information, Awareness: *A disc based educational package designed as a coherent, practical introduction to the ways in which computers are used in everyday life. The six programs cover creating a file of music records, managing a fictitious airline, searching a document, payroll management, word processing, and a search of criminal records.* (Pitmansoft)

* * *

BBC Micro Utilities: *A tape and booklet pack designed to assist in overcoming major hurdles in machine code programming. The tape contains Beebmon, a monitor, disassembler, and memory mover plus 17 of the longer machine code routines from the BBC Micro assembly language book by Bruce Smith.* (Shiva)

* * *

Pirate: *This is an adventure game which combines colourful graphics, animation and sound. As the captain of a pirate ship you must steer your ship through the maze of reefs and islands. Deal with the hazards you encounter on the way and gain points for finding treasure, secret objects and a password. Single function key entry provides the command selection.* (Chalksoft)

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each group in turn presents its quotations.

These are based on the risk factor each client presents and each group has to quote premiums which attract customers but which cover the costs of any accidents.

A group starts with a capital of £50,000, and after all tenders have been received the program displays a balance sheet for each of the companies in turn.

This shows numbers of new clients, income from new and old clients, the number of claims, liabilities and overheads as well as opening and closing balances. The group with the largest balance at the end wins.

Initially, groups will find difficulty giving quotations which attract new customers at premiums showing a profit but as the game progresses players assimilate knowledge of the risks associated with different types of road user and the competition gets keener.

The game can be played several times with each group because client details are randomised and although there is an element of chance in the accidents there is a heavy bias towards real life risks.

John Daddy

Riding pretty high

IT had to come sooner or later with the current BMX craze – Superior Software unashamedly presents **BMX on the Moon.**

Fortunately, the game isn't quite as cheap as it sounds. It's a rehash of the old fashioned 'dodging and shooting while smoothly scrolling' theme.

This game comprises a lunar landscape, a moon cycle – the pseudo BMX – rocks, menacing barrels, overhead hovering nasties and liberal unpleasantness.

Each go is divided into different screens of increasing difficulty. At the start you only have hovering spaceships to contend with. These can be shot quite easily with your guns which fire both upwards and forwards.

As you progress through the screens, the existing aliens get meaner and new variants are introduced. Bouncing monsters appear in awkward positions, barrels fly towards you which are too high to jump over, too low to drive under and too high to shoot at.

Spaceships overhead start to pepper the landscapes with craters which adds something else to be negotiated.

You select which skill level you want. On a high skill level, the landscape has hills in it, which can contain partially hidden rocks. Worse still the landscape can be on the receiving end of the forward gun when you intend shooting upwards – leaving a whopping great crater.

The game has some nice gimmicks including the high scores and the level dissolving in front of your eyes rather than the screen simply being blanked instantly. The high-scores are all in chunky lettering and the 'game over' message appears to the accompaniment of vollies of explosions.

An annoying feature is that if you change to a different level and then change back to the original level, all the high-scores are gone.

The instructions are quite comprehensive giving details of what to do, and when and how to do it.

The keys are well thought out which is as well since there is no joystick option.

The graphics are nothing special, nor are the sound effects though I must say that I've seen worse.

Summing it all up – nice gimmicks, but shame about the game.

It's expensive for what it is but may appeal to the younger end of the market because of its simplicity.

Philip Tudor

Fair shares all round

SHARE ANALYSER, from Synergy Software, has been designed to aid investors who have a small portfolio of shares to manage. I found it a pleasure to use. It has superb graph-plotting capabilities.

There are disc and cassette versions which are apparently quite different in the way data is entered and stored. I have only examined the disc version and this allows up to 20 different investments to be handled.

To begin, the user would enter the details of the shares owned – the portfolio. As items are subsequently bought and sold the portfolio details would be brought up to date – number of shares and their purchase or selling price.

Expenses and dividends received can also be recorded and up to 16 lines of information can be stored for each share.

The market price of each share can be entered at any desired frequency – for example, at the end of each day.

The program simply provides 1,000 slots for the price information of each share and these can be used as desired although a careful manual record would have to be kept as to what date (or hour) each slot represented.

It is easy to amend either single entries or whole ranges of share prices.

Using the latest share prices, the program will evaluate the portfolio and work out how much notional profit has been made. Some temporary changes can be made to the data before this is done – for example to take account of estimated selling expenses.

When the share price charting option is selected the program's graph capabilities become apparent. The graphs can be automatically scaled or the user can choose the X and Y ranges.

Graphs of different shares can be superimposed and the result labelled and printed.

Various statistical processes which may be of help to investors can also be carried out – plotting centred or lagged moving averages, rise and fall indicators and low indicators.

In summary, an excellent program which I found very easy to use and which should be of considerable interest to anyone with a small portfolio of stock exhange investments.

Ken Garrett

Tourist package

TOURISM is another good teaching aid from Andrea Tapsfield and Nelson CAL.

The programs are backed up by a clearly organised set of notes illustrating all the basic steps plus running hints and instructions for a printer link up. Some very useful students' materials are included in the notes as a basis for a number of interesting lessons.

The first of the two programs includes a number of important skills and ideas central to much of geography teaching. It simulates the general development of tourism on a tropical island.

The main idea is to select suitable sites for holiday activities bearing in mind some of the economic and physical factors affecting development.

Initially a choice has to be made on the type of holiday (beach, scenery/wildlife or historical) and then the type of accommodation (self-catering chalets, package tour hotels, luxury hotels and camping sites).

Using physical and economic weightings entered from the keyboard a survey of the island is undertaken and a map produced for the particular activity chosen.

Accompanying this is a list of

the suggested sites with a grid reference location, a score count based on the weightings and suggested development costs – high, medium or low.

The program lends itself to various uses. For example: varying the weightings and assessing development locations, studying the optimum locations for different holiday types and comparing class maps with those produced by the micro.

It is in this type of work that the micro can make a very useful contribution to the subject area by allowing a variety of alternatives to be rapidly produced.

Program Two allows the student to manage a tourist business on the same island over a period of two years. There are three decisions to be made each year – the number of tourist places, the amount of money spent on advertising and the number of people to employ.

It is possible for various groups to try to develop different sites at the same time and take their turn at typing in their decisions. This could be particularly useful in a classroom with only one micro available.

At the end of the year, a balance sheet is given along with the percentage changes in the types of accommodation. It is something of a pity that summary graphs could not be provided to vary the screen presentations but this does not detract from the overall usefulness.

The programs are well constructed and easy to use. They allow the development of various ideas related to tourism such as earning foreign income, developing employment and making profits.

This is a package that could result in much useful discussion with enough interaction to hold students' attention.

Norman Parr

Colourful Kestrel

THERE are some quite nice effects to be obtained using **Art Designer** – another graphic design package for the BBC

SOFTWARE SPECIALISTS
DESIGNER
BBC MICRO B
ELECTRON

Model B and Electron.

It does not aim to be in the same vein as the usual line-arc-triangle-circle packages which all turn out to be much of a muchness.

Here they have decided to be slightly off the others' wavelength and in several ways this policy comes up with some nice touches while in others the user pays for eccentricity.

It works in Mode 2, losing sharpness but gaining all the possible colours, and has only Draw to, Text, Circle and Ellipse procedures in common with the rest of the herd.

It shows its individuality by having such functions as Airbrush – variable densities of dots sprayed at the screen in the area around the cursor; two infill techniques which give the facility to create many shades of colour; user defined characters – defined in a separate part of the program suite and then brought on command into the main drawing where required; and Kestrel.

Kestrel is a little character that the programmers have previously defined which looks vaguely like the bird, although any self respecting kestrel would sue for defamation.

It is not just plonked on the screen like the other user-defined characters but can be dragged around by the cursor leaving a trail behind it. I am not too sure what it is meant to achieve but it does give an idea of the program's off-beam approach.

My copy had a bug in it which kept giving SYNTAX ERROR whenever I tried to WIPE the screen or call up MENU.

However, this is a minor

→

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matter – it is the command message idiosyncracies that I felt rather distracted from the enjoyment of the program.

Most of the commands have to be called using Ctrl plus character which calls for a lot of hand waving and doubles the workload, and generally the program is rather slow in setting up the effects.

I think it would take quite a while to get really proficient.

That being said, it isn't like all the others and *that* I do like.

Terry Hallard

Flexible geography

DEVELOPING CITIES from Nelson CAL is a well designed and packaged set of programs on a number of themes fundamental to urban geography.

It comes as a disc with four programs and a useful set of notes including teaching objectives and suggestions for worksheets. There are screen dumps throughout the notes illustrating all the basic screens, and the instructions for inexperienced users are particularly easy to follow.

The first program, Cities One, is a simple simulation relating to rural-urban migration. It needs only a yes or no answer to each question and so is not particularly interactive.

Some of the decisions are not all that instructive but it is useful as a vehicle for further discussion. It is the weakest of the four with rather an uninteresting screen layout.

However don't let this put you off. This disc is well worth buying for Cities Two and Three. These are excellent representations of age-sex pyramids and other endless opportunities for both lesson and individual use.

Cities Two concentrates on the population structures of five countries – the Philippines, Bolivia, Libya, Peru and Sweden. Through a very effective set of keywords the population structures may be investigated using for example birth and death rates, fertility ratios and urban populations.

What particularly interests me is the flexibility built into the program enabling the user to project the populations over five year intervals and to change the basic rates.

Here there are LOOK BACK and OVERLAY facilities to emphasise the changes taking place. Also included is a HELP request to list the keywords.

This program is complemented by Cities Three which looks at the age-sex structure changes in a hypothetical city called Neltown (Ugh).

Here is a classic city structure in a developing country with an emphasis on migration.

Through the clear screen layout it is quickly possible to absorb the fundamentals of the structure and identify the problems. Through the CHANGE RATES and NEW VALUES keywords the structures may be rapidly altered and students able to gain a deeper insight into some of the complex problems facing these cities.

Build, the fourth program, allows you to enter your own data for the population pyramids in Cities Two. The notes give instructions to assist this and even suggest a source book for demographic information with a matrix to assist this data collection.

Also included are notes relating to potential running problems and how to get a printer copy of the results. This latter section is not easy for the inexperienced user. Useful references are also made to text book materials which develop and reinforce key ideas.

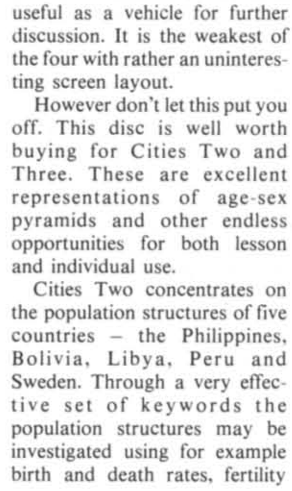
Where would you use these programs in your scheme of work?

They are flexible enough to fit into various niches particularly in fourth and fifth form courses where there may be an emphasis on development studies and in sixth form advanced work.

This is a highly recommended package which illustrates just how useful a micro can be as a learning aid.

Norman Parr

Not different - just meaner!



SINBAD, from Virgin, is one of those *quest for the ultimate goal* programs. Sinbad – that's you – must complete each screen in order to go on to the next one.

Unfortunately, there are only two different screens, and later screens are just meaner versions of the first two.

To start with, Sinbad must convert his enemies to a peaceful way of life by touching them – sounds familiar? His enemies float around the screen and Sinbad can leap onto a rope ladder dangling from a flying carpet when it drifts low enough.

Once he's on, it's running up and down time until one of his converts knocks him off. Converts aren't all that peaceful! On later versions of this screen, nasties lurk at the bottom. Falling on them loses energy and turns all the converts mean again.

When everything's converted, you appear on your rug just above Earth's atmosphere dodging the passing asteroids in time to a very space-age rendition of Star Trek.

You must dodge the asteroids for as long as you took to do the first screen. This time factor is raved about a great deal in the instructions. The asteroids simply get faster on later screens. Your score is the percentage of the entire adventure completed.

Getting through both screens three times yields about 50 per cent. Once again, the reams of instructions rant on about the surprise awaiting you when you finish. (Will the machine crash I ask myself?)

They do tell you the keys but you have to wade through a lot of rubbish before you get to the important stuff. Virgin do, however, put a screen picture on the cover which makes sure the user knows what he's getting.

The graphics are average but effective. The sound is quite good with various interesting noises always drifting from the loudspeaker.

Joysticks can be used and I'd recommend them because of the repeated hammering on the edge of the space bar to jump.

All things considered, it's a reasonable game but is aimed at the younger end of the market.

Philip Tudor

BBC MODEL B JOYSTICKS OPTIONAL
ARENA 3000
MICRODEAL

Hot time in the arena

IT is the year 3000 AD and the excitement hots up at the local arena. A poor little humanoid has been thrust into the arena to entertain crowds who have flocked from surrounding galaxies to see him fight to the death.

This is the scenario of **Arena 3000 AD**, one of the new releases from Microdeal.

What has this poor insignificant little soul done to deserve this? Perhaps he's just a "human-annoyed!" Sorry I

→

brother
commodore 64
DRAG

Choosing a printer is a lot easier than choosing a computer.

THERE are dozens of quality printers from which to choose. With quality price tags of around £250.

The Brother M-1009, however, breaks all the rules.

Stays defiantly below the £200 barrier.

Though it has far more than its fair share of features, it maintains the extraordinarily low price of £199.95.

Travels at a steady fifty.

In the speed stakes, the M-1009 is certainly no slouch, being fully capable of up to 50 characters per second.

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Being an impact printer, the M-1009 will print on virtually any paper, including letter headings, invoices and standard office stationery.

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A superb character recommendation.

In its price range, the M-1009 has a great deal more character than many printers.

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Built to the same exacting standards as Brother's elite office printers, the Brother M-1009 already has faultless credentials for reliability.

Its 9 pin dot matrix head, for example, has an astonishing 20 million character service life.

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MAJOR DEPARTMENT STORES AND ALL GOOD COMPUTER SHOPS.

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shouldn't joke.

Surrounded by at least 20 ravenous robots there is no time to hang about.

"Not a hope" you might say – and you'll be right if you didn't keep moving about and firing your deathray at the enemies with great accuracy and care.

Can you imagine it? This dear little humanoid dodging and running for its life while trying to shoot in the right direction.

Once you have cleared the arena of all mutants you are yet again thrust into another selection of weird mechanical failures which you must destroy or be destroyed.

This process repeats itself, presenting you with a different selection of enemies every time the arena has been cleared.

The general idea of the game is quite good and becomes addictive, although the graphics were by no means the best I have seen.

Mark Freeman

The better side of CAL

INTO the Unknown is an admirable package dealing with 15th century exploration, produced by Tressell Publications – a non-profit making cooperative of teachers.

One of their stated aims is to encourage active learning by pupils and I am convinced that materials of this quality and design will achieve that.

There is a wealth of useful material along with the actual programs. This includes an excellent teachers' handbook, 12 information sheets, a supply of exploration charts with a voyage key and posters on voyages of exploration, ship design and the world in 1459.

The authors are quite right when they suggest that this is "a substantial learning package that can offer anything up to a term's work for the 10 to 14 year old age-range for which it was designed".

The program consists of five topics and a starting unit plus a menu on the disc version. Clear and detailed loading and running instructions are included in the handbook so there should be no problems for inexperienced users.

These topics are The Unknown, Travellers Tales, The Ship, Supplies and Navigation. Together these link back to the information pack and provide useful information for the budding matelots.

All the exercises are geared to making a voyage of discovery during which unknown seas are charted along with new lands and hopefully great wealth acquired.

The ultimate goal is to return to the home port with the ship and crew intact and enough cargo to make the voyage profitable. However don't be too greedy and overload the ship with gold – there is always fear, shipwreck and mutiny to contend with.

The voyage is logged onto the exploration chart and it is a most interesting and realistic experience when moving into the truly unknown spaces.

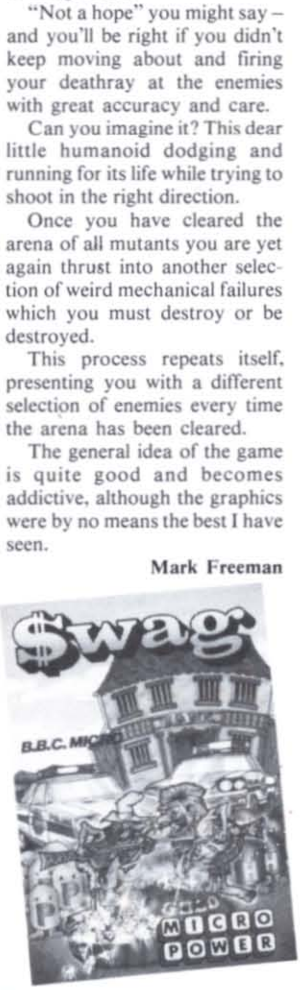
Coastlines may be easily mapped and harbours located. From these harbours explorations may be made inland but must be carefully planned. All this is based on a real continental area which one would eventually recognise as . . . but that would spoil the fun!

Yes, education can be fun and packages like this are full of facts which help to develop intellectual/social skills in an entertaining way.

Finally, I must echo another comment in the handbook where it says " . . . there is considerably more work done by the pupils off the screen than in front of it. The computer provides the framework and the motivation. That, essentially, is what we feel that computer assisted learning is meant to be like".

This whole approach is highly recommended and tremendous value.

Norman Parr



Hazard hazards

SWAG, from Program Power, is a story of simple hill billy folk down in Hazard County who appear to have a tendency towards kleptomania.

Then again, who wouldn't when piles of gold and diamonds keep appearing from nowhere just waiting to be claimed?

The aim of this two player game is to collect a total of £250,000 worth of the loot before your opponent does.

The screen is designed in the shape of a fenced corral in which are situated a bank, a shop and you and your opponent's shacks.

As you both wander around the screen, small piles of gold and diamonds will appear. It is up to you to get there first, grab them, then head for the safety of your shack.

Unfortunately, like life, it's never as simple as it first seems. An insurance company is intent upon stopping both light fingered players from sneaking off with the jewels.

In order to achieve this they employ the use of several killer droids. Bump into them and you drop whatever you are carrying and are returned to your shack.

The droids fall into two categories, Percys and Henrys. Percys home in on your player, Henrys on your opponent's. However, when shot, a Percy will become a Henry. It is therefore possible, with a little fancy shooting, to make all your droids attack your opponent, thereby gaining yourself a little time in which to amass some cash.

Although advertised as a two player game, there is a one player practice option.

Unfortunately the possibilities of the scenario have not been used to the full, and as a result the game became tedious after only one or two plays.

Jon Revis

Get to know Europe

IF you have ever wondered what the population of Poland is, or possibly the major industry of Andorra, then **European Knowledge** is definitely for you.

It is available from Micro Power and is designed to help test and increase your general knowledge about many of our well known, and some not so well known, international neighbours.

The loading instructions are well developed and very easy to follow, with allowances made for both disc and network system users. They should be comprehensive enough for even the most inexperienced user.

The screen consists of a map of Europe with 34 different countries, some as far afield as Iceland and Turkey. All are marked, although some of the smaller countries are a little hard to identify.

There are five levels of difficulty and these later determine the time limit in which you have to answer each question.

The quiz is in the form of 40 randomly selected, multiple choice questions on varied topics about each country.

My only real criticism is that the level of play you select only alters the time available to answer each question and not the individual difficulty of the questions.

This makes it very easy to learn all the answers to a total of over 270 questions – at a low level.

Overall this is a well put together program. I feel that the most benefit wil be gained by the pre 'O' level age groups for which it has apparently been designed.

Tarquin Thomas

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GRAPHICS TABLET
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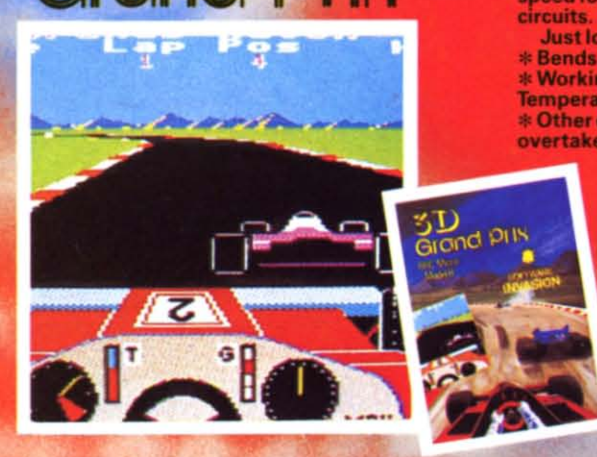

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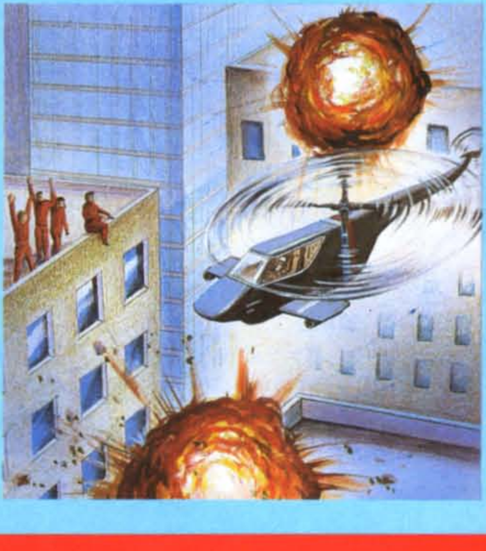

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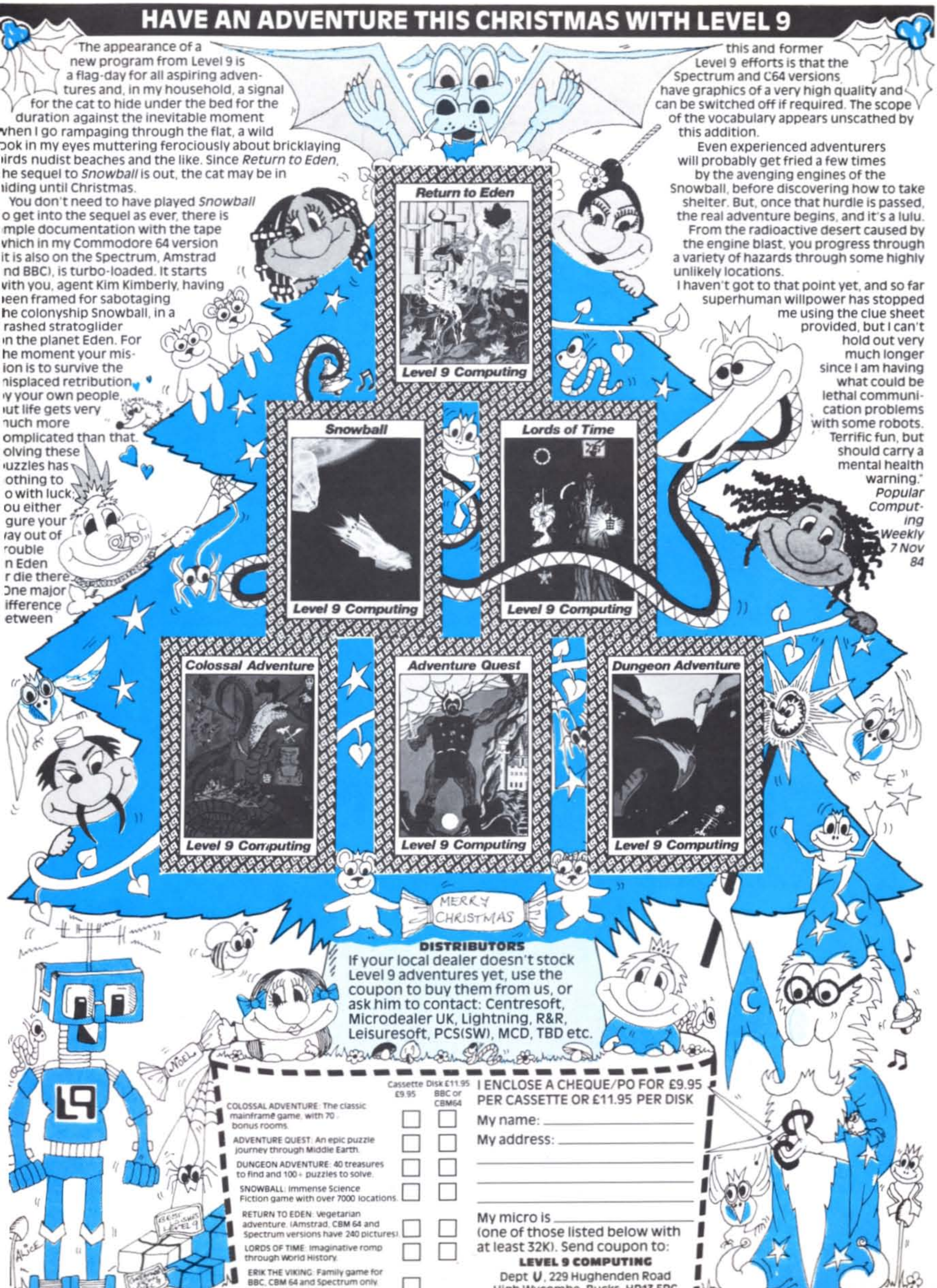
You don't need to have played *Snowball* o get into the sequel as ever, there is ample documentation with the tape which in my Commodore 64 version it is also on the Spectrum, Amstrad nd BBC), is turbo-loaded. It starts with you, agent Kim Kimberly, having been framed for sabotaging he colonyship Snowball, in a rashed stratoglider on the planet Eden. For he moment your mission is to survive the misplaced retribution by your own people, but life gets very much more omplicated than that. olving these puzzles has othing to o with luck; ou either gure your way out of rouble n Eden r die there. One major ifference etween this and former Level 9 efforts is that the Spectrum and C64 versions have graphics of a very high quality and can be switched off if required. The scope of the vocabulary appears unscathed by this addition.

Even experienced adventurers will probably get fried a few times by the avenging engines of the Snowball, before discovering how to take shelter. But, once that hurdle is passed, the real adventure begins, and it's a lulu. From the radioactive desert caused by the engine blast, you progress through a variety of hazards through some highly unlikely locations.

I haven't got to that point yet, and so far superhuman willpower has stopped me using the clue sheet provided, but I can't hold out very much longer since I am having what could be lethal communication problems with some robots. Terrific fun, but should carry a mental health warning."

Popular Computing Weekly 7 Nov 84



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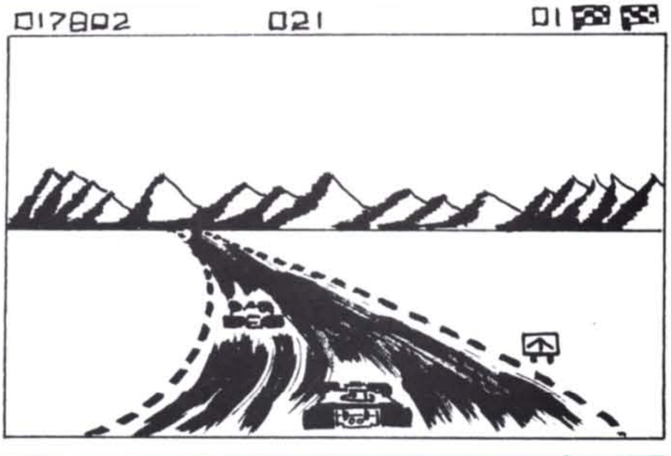

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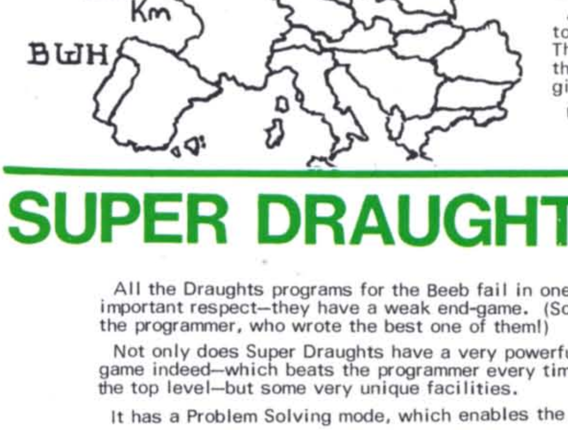

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All the Draughts programs for the Beeb fail in one important respect—they have a weak end-game. (So says the programmer, who wrote the best one of them!)

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Elite... deadly dangerous but brilliant

FOR those whose appetite was whetted by our December review of Elite, here's a description from the seasoned adventurer's point of view . . .

AT first sight this is a mixture of the old *TREK and Acornsoft's Aviator plus a dash of buying and selling in order to become the terror of eight galaxies.

However the implementation and the result is brilliant, simply one of the best micro games I've seen so far.

The game is in two parts – the first allows you to trade (à la Ace Garp) for food, computers, narcotics and even slaves in order to equip your ship with the space equivalent of Dirty Harry's Magnum .44 – namely a military laser.

There are other fairly lethal items but the extra cargo hold is the most useful and the military laser is the most satisfying and necessary. It destroys ships that other weapons cannot reach without any of the nasty side-effects of an energy bomb.

You can take your time trading but, once launched into space, real time takes over. Actually it's (real time) × (a few thousand) otherwise the inhabitants of the planets must live on their ceilings (or "Mummy, why do I keep going round in circles?" – "Shut up or I'll nail your other foot to the floor").

A quick look in the rear view at the dreaded letter box entrance to the space station confirms the faster passage of time (otherwise they would be squashed flat in there), so hit the hyperspace button, give the station a farewell blast with the rear laser (their slave prices were sunlit robbery) and jump six light years just as the local Sweeny come swarming.

The program uses Mode 4, Mode 5 and interrupts to give a split screen effect. The top five-sixths shows the view outside and the bottom (Mode 5) shows your instrument panel complete with homing compass and "3-D" display of the local space.

Locate the new planet's beacon and space-skip in until you hear the buzz that means you have company. Thanks to the purchase of a self-centering joystick – for real bims – and three weeks practice you probably welcome the prospect of a turkey shoot and have thoughtfully left a little cargo space to pick up any remnants of your victims.

So a couple of minutes of "float like a butterfly, sting like a bee". Funny how, although I'm pulling at least 50g on the fly-by-wire stick, they always seem to hit me with their pathetic weapons. Then into the safe zone around the new space station.

Aim for the line between the station and the planet (a mere 50 kilometres below – how do they cram so many denizens in down there?) switch on the docking computer and have a chat with the MOSTLY HARMLESS person who is waiting for his turn only to hear that the docking computer has fouled up again and scraped all your front shields away – it must have old T.I. chips and no money back guarantee.

Good job you'd saved the game at the last port of call.

Actually I'm quite useless at the game but enjoy watching good players, with an original line of repartee, relieving their psychopathic urges. By a good player I mean someone who has flown his Spitfire upside down through Acornsville and turned corners.

However even players of this calibre take a week or so to become COMPETENT and then things get potentially DANGEROUS.

At this level you will eventually receive a message that a new ship, the Constrictor, has been stolen from the navy yards and was last seen near a certain planet.

Will you accept the mission of tracking it down? Of course you will and so you locate and travel to the given planet to be told that the Constrictor left some three weeks before headed towards another planet.

When you arrive there the Constrictor has been on a rampage, shot up numerous police ships and made a Galactic jump.

Eventually you will catch up for the showdown – it usually starts with several missiles homing in on your rear end. If you can survive a five minute dog fight then you become DANGEROUS with only two grades to go to ELITE. Fame, plus £100 worth of software, is the spur.

Apparently even the authors have not attained the top level which means that true grit, of a kind only teenagers have, is required. For the more mature among us it's only a lot of lines on a screen whereas a good text adventure invokes and involves our intelligence *blah blah blah*.

Although the final step must be a grind this is not true of the early stages. The player can visit 2040 planets (via a trick similar but much more developed than Level 9's Snowball) and can choose a number of strategies in his travels.

For example he can trade honestly or

he can trade in illegal goods which give bigger profits but also attract the attention of the Galactic Police.

If you choose the left hand path then you should buy an escape capsule because not only is it fun to use (you see your space ship drifting away as you escape) but also you keep all your dirty money, get a brand new, similarly equipped (less capsule) Cobra space ship and a clean Bill bill.

All these delights can only be experienced after learning to dock your ship – the real reason the space stations spin so quickly.

After a while you can hum a snatch of the Blue Danube as you slot in. But out there the Thargoids are waiting in deep space, their Rigelian hot-shot is lethal and they seem impervious to military lasers. Will only an energy bomb rid you of these turbulent insectoids?

Definitely the game for Christmas 1985 but you really need a self-centering joystick to play well.

Alice through the VDU

Our monthly foray into Adventure games

In search of the perfect program

SOME people have asked about Edsgar and his quest for the perfect program. Many years ago Edsgar visited Japan and banished Mr Goto from a committee to design a friendly language – a language that doesn't just STOP but keeps saying you can't if you try to do something that it thinks you didn't want to do.

The result was you have to declare everything before you can do anything so other committees introduced UNSPEC which is a magic word that again lets you do as you please.

After that Edsgar visited the land of Oz where Col lived. Now Col was renowned the length of the land for his analysis of the smile of the Mona Lisa during a computer graphics conference and I had a certain reputation for rambling about computer theory for hours without getting anywhere (an example is this month's puzzle). We both thought that computing was more interesting than useful.

We were listening to Edsgar make the adding of two variables into an impossible task when someone asked how long it would take him to write a program to add two numbers. Edsgar replied that after 20 years practice and experience he could now do it in a few hours.

This amused the audience but Edsgar then said that he didn't travel 12,000 miles to make jokes. I looked Col straight in the eye and we both said:

"I WOULD".

For those ignorami who wondered about Chomsky 2, this defines any language that can be specified in standard Backus-Naur Form (English is Chomsky –100). Jargon and standards help professionals to talk about things – the simplest examples are the names for bit and word lengths thus:

1	**BIT (BInary digiT)**
2	**QUARTER (2 BITS)**
4	**NYBBLE**
8	**BYTE**
16	**MOUTHFULL**
32	**SLICE**
64	**BUTTY**

Of course such standards only operate at very primitive levels and cannot be applied to the current raison d'être of computers – namely solving human problems (computers were originally developed to design better hydrogen bombs).

Although the measure of all things, humans are also the biggest problem for (and nuisance to) systems programmers. Without them everything would be perfect.

For example, I remember an attempt to estimate how much time and resources should be allocated to new users on a mainframe. This machine was linked to a device that scanned bubble chamber photographs looking for and measuring lines created by the collisions of sub-atomic particles.

Now old dogs are dim and need a lot of machine time so it was proposed that the new users should be photographed and that the computer would then scan these portraits to estimate the time required by dividing the number of lines on the face by the number of hairs on the head+1. This scheme was rejected on the grounds of sexual discrimination.

Challenge from Satan

TALKING about thin hair, I recently received Satan's Challenge from Microtest on an 80 track disc. An attempt to copy it to a 40 track evoked the response that ravening wolves would tear me limb from limb, so I asked Microtest for a 40 track version.

This quickly arrived and was similarly well cursed and protected (the tracks are scrambled) so, like Mocata in "The Devil Rides Out", I got someone else to investigate.

A fortunate decision since my hair is shingled and the longest strands are about nine inches, whereas Christopher Robin will soon get all the machine time he wants if the above portrait scheme was used.

Written in Basic the program gives

→

From Page 71

(compressed) text only and has been carefully designed as "an easy adventure to get into but devilishly difficult to end".

The author gives you four areas to explore – a house, a church, a wood and a graveyard. You can enter any area from the start and only the house is difficult to leave.

Your task is to locate a talisman and then prepare a pentagram to summon up Old Nick himself.

So you wander around the rooms (note that the maze under the church doesn't need to read from the disc) locating the various bits and pieces like salt, cups, holy water, candles and horseshoes.

In your travels you meet the remains of Molly Mindley (who smoked like a chimbley) and a number of "seveer", even *crusial* spelling errors – surely "light" should be spelt "loight"?

There is no score and I've seen about 200 rooms – it's a biggy – so the only way I can judge how far I've got is by listing the objects and checking them off. I've got everything except the rope and the talisman so into the vault again for a thorough search and up comes the Angel of Death.

Now I still don't know the last two lines of the Sussamma Ritual but neither does the program so scare him off with ****, drop **** – and **** kills me five rooms later? Since REMOVE don't work I asked Microtest if this was a bug but no answer yet.

Of the 13 grades of the Occult the author is still a Probationer who must "learn to write a careful record". It's good but if you are going to write an Ipsissimus program, I think you should try to scare the player.

This may sound impossible but what would you do if the program offered to give you certain powers in its world providing you signed your soul away? Me – I'd get a listing and look at the small print very carefully.

Protection

TWO programs for the price of one and both suitable for nine year olds and over? This is certainly true for Ebony Castle, but Xanadu has some remarkable protection – it's in assembler and the Break key is trapped.

Even *LOAD and MZAP only reveal the verbs (given to you anyway) and the objects. The room descriptions are read off the end of the tape.

So I've had to play fair and, just like Colossal Cave, I got stuck very quickly – I ask you just how many nine year olds know how Joshua *fit* the battle of Jericho? I went blue in the face by the oak tree so decided to map the subterranean river – there must be a trick to it, and there is.

One of the seemingly unique features of Colossal was that if you blundered around long enough, it would give you a hint – Xanadu needs this feature badly otherwise many people just won't get started.

I persisted because of the humorous result of climbing trees and, once outside the walls, things do get a lot easier but the "anechoic" chamber defeats me.

In such rooms the walls have baffles to absorb sound – you can hear your own heart beating after a while – so I try to GET GONG and only get I CAN'T HEAR YOU! A nice touch (and it hears QUIT quick enough) but a noisy factory would be more realistic.

So far I've found the oak tree door and solved the cubic equation – which caused last month's ramble – but I can't drop the drawbridge or get back from the banqueting hall. Still I've seen enough to know that your aim in life is to stock the shelves in the cottage.

If, however, you enjoy breaking programs, then these games are good practice for 18+ year olds.

Problem

AN essential element, indeed almost a definition of an adventure is that the player moves around, picking up and dropping objects, until the game is solved and the program STOPs.

If you think you have a few good ideas but don't know how to start then you could try writing a program to solve the following problem.

You are as usual, alone in a system of caves/rooms that stretch into the distance to the East and the West. You are carrying a hod of bricks and five cards as follows:

Card	*Empty*	*Not empty*
1	DROP,E,2	GET,W,3
2	DROP,E,3	GET,E,5
3	DROP,W,1	GET,E,2
4	DROP,W,3	E,1
5	E,4	STOP

All the caves are empty and all you have to do is take the role of the computer for a change – that is obey the instructions on the cards beginning with card one which says:

IF this cave is EMPTY THEN DROP a brick, go EAST and obey card two ELSE GET the brick, go WEST and obey card three.

If you follow the instructions correctly you will eventually reach the STOP on card five. The questions are: *How many bricks will you drop,* and *how many E/W moves will you make?*

A couple of hints – you should never have to go further than 10 caves to the West. Nevertheless don't try solving the problem with real bricks.

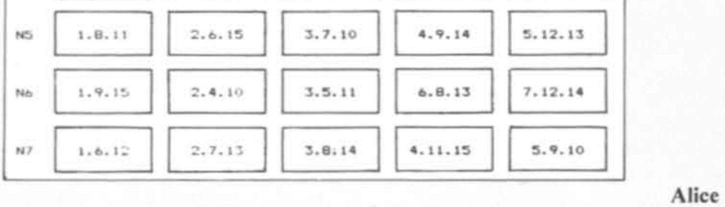
There is a prize for the fastest Basic solution obtained on a Beeb.

Solution

THE problem posed in the September issue of how to become governor and make Filthy Fifteen STOP is difficult even though there are thousands of solutions.

The simplest general method is to modify the program to search through possible combinations; rather like solving the eight queens on a chess board puzzle.

No one has done this so the prize goes to Steven Chmiel who was first with this particular solution:



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N4	1.5.14	2.9.12	3.4.13	6.7.11	8.10.15
N5	1.8.11	2.6.15	3.7.10	4.9.14	5.12.13
N6	1.9.15	2.4.10	3.5.11	6.8.13	7.12.14
N7	1.6.12	2.7.13	3.8:14	4.11.15	5.9.10

Alice

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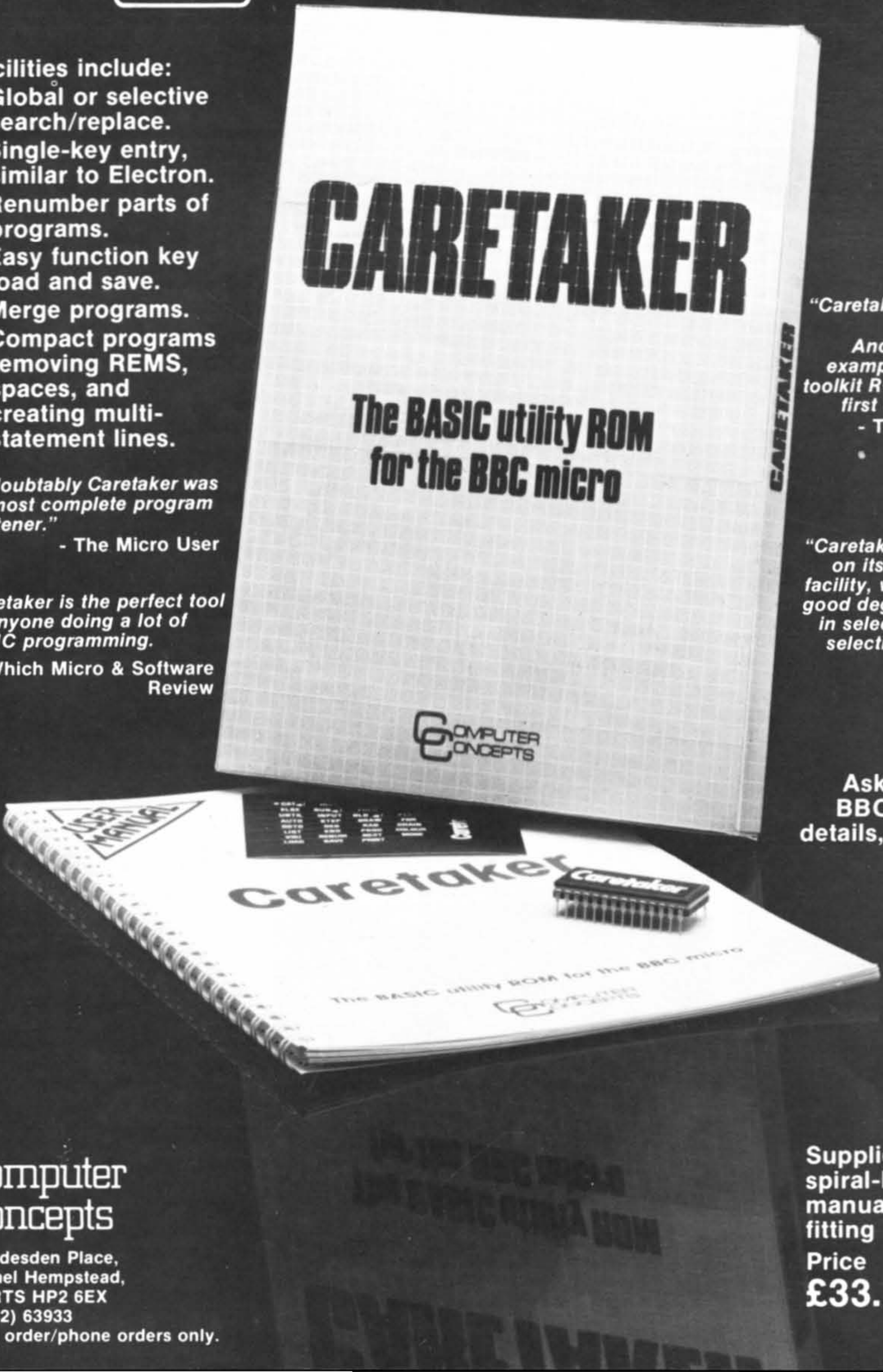
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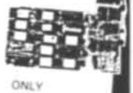

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Part 21 of MIKE BIBBY's introduction to programming

BBC hot line to subscripted variables

DOES anyone remember "First Aid in English"? In those far distant days of primary school, "First Aid" was the staple diet of English lessons, which were far more formal than at present.

Although still in print, it's gone somewhat out of fashion in today's progressive education. Program I is my tribute to the work.

```
  10 REM PROGRAM I
  20 MODE 6
  30 positive$ = "hot"
  40 comparative$ = "hotter"
  50 superlative$ = "hottest"
  60 PRINT positive$, comparative$,
superlative$
```

Program I

You'll probably remember "degrees of comparison" of adjectives (for those of you who want to flaunt your youth, adjectives are words that describe things).

Degrees of comparison means the way adjectives change when you're describing two or more things as in:

the big house
the bigger house
the biggest house

Big was called positive because you were only talking about one thing. *Bigger* was comparative because you were comparing things, and *biggest* was superlative, referring to three or more things.

The fun was for the teacher to trick you into saying "the tallest twin" or "good, gooder, goodest".

Happy days, and such vital knowledge . . .

Still, it allows me to give you a nice example of how we can extend subscripted variables. Program I prints out the positive, comparative and superlative of "hot" – but it hasn't got a subscripted variable. However I think you'll agree that the variables I do use adequately label their values!

```
10 REM PROGRAM II
20 MODE 6
30 DIM adj$(3)
40 adj$(1) = "hot"
50 adj$(2) = "hotter"
60 adj$(3) = "hottest"
70 PRINT adj$(1), adj$(2), adj$(3)
```

Program II

Program II shows subscripts in action. We now have as a variable the array *adj$()* (short for adjective), which is DIMmed in line 30.

(Notice, by the way, that throughout this article I ignore the *0th* element of an array. In theory this is because I want to keep things as simple as possible. In practice it's because in my "real" programs I normally reserve the zeroth element of an array for the values I'd forgotten.)

Right, so I've now got a program that prints out hot, hotter, hottest – and demonstrates my mastery of subscripted variables.

But there are adjectives in the world other than hot. Let's extend our program to deal with two adjectives – Program III shows what's needed.

I now have two arrays and, not unnaturally, I call the first array *adj1$()* and the second *adj2$()* (line 30). I then assign the degrees of hot to *adj1()* (lines 40-60) and the degrees of big to *adj2()* (lines 70-90) before printing them out.

adj1$() and *adj2$()* don't differ too much, do they? Just the 1 and the 2 vary so that *adj1$()* holds the value for hot, while *adj2$()* holds the value for big.

If you like we could say that *adj1$()* holds one "layer of values" while *adj2$()* holds another layer. If we had a third layer – say tall, taller, tallest – we could call it *adj3$()* and so on, referring to different layers by using different numbers in the variable names.

```
10 REM PROGRAM III
20 MODE 6
30 DIM adj1$(3), adj2$(3)
40 adj1$(1) = "hot"
50 adj1$(2) = "hotter"
60 adj1$(3) = "hottest"
70 adj2$(1) = "big"
80 adj2$(2) = "bigger"
90 adj2$(3) = "biggest"
100 PRINT adj1$(1),adj1$(2),adj1$(3)
110 PRINT
120 PRINT adj2$(1),adj2$(2),adj2$(3)
```

Program III

The number inside the brackets of the variable tells us which of the values, or elements, in that particular layer we want.

Table I shows how we could arrange all this, and Table II shows the same

		Element Number		
		1)	2)	3)
Layer	adj1$	adj1$(1)	adj1$(2)	adj1$(3)
	adj2$	adj2$(1)	adj2$(2)	adj2$(3)
	adj3$	adj3$(1)	adj3$(2)	adj3$(3)

Table I

		Element Number		
		1)	2)	3)
Layer	adj1$	hot	hotter	hottest
	adj2$	big	bigger	biggest
	adj3$	tall	taller	tallest

Table II

From Page 75

thing with the actual values substituted for the variable names.

Nice and ordered, isn't it, with the second element of each layer, or row, containing the comparative ("–er") form of each different adjective and so on?

To find the superlative ("–est") values of the adjectives we'd just print out all the values in "column" three – that is, those variables with the same subscript, three.

Alternatively, to print out all three degrees of one particular adjective we'd just print out all the values on that particular layer.

Take a look at Program IV – this does exactly the same as Programs I and II, printing out one layer of values – hot, hotter, hottest.

Really it's just a cut down version of Program III. Remember, the 1 in *adj1$* refers to the layer or row we're talking about, though in this case we've only got one row.

```
10 REM PROGRAM IV
20 MODE 6
30 DIM adj1$(3)
40 adj1$(1) = "hot"
50 adj1$(2) = "hotter"
60 adj1$(3) = "hottest"
70 PRINT adj1$(1),adj1$(2),adj1$(3)
```

Program IV

Now labelling different layers with different variables is all well and good. I think you can see by now that *team2$()* is going to refer to data on team 2, where team 2 is one of a set of teams.

But the BBC Micro can't see this. To realise that the 2 in *team2$* means layer or row number 2 it needs the number somewhere it can get at it. And that means not hidden in the array variable's name, but in the brackets following it.

I know we've already got one number there, but that doesn't matter. Basic can handle two, as you'll see shortly. Let's take our last program for example.

Instead of talking about *adj1$()* we're going to talk about *adj$(1,)*. We've put the 1 referring to the layer inside the brackets. It's followed by a comma because we still need to put a second number in – the one that specifies which element of that layer we want. (The second number is the one we're used to working with in subscripted arrays.) So:

adj$(1,1) would take the place of *adj1$(1)*

adj$(1,2) would take the place of *adj1$(2)*

adj$(1,3) would take the place of *adj1$(3)*

Program V is equivalent to Program IV, yet incorporates these new techniques.

```
10 REM PROGRAM V
20 MODE 6
30 DIM adj$(1,3)
40 adj$(1,1) = "hot"
50 adj$(1,2) = "hotter"
60 adj$(1,3) = "hottest"
70 PRINT adj$(1,1), adj$(1,2),
adj$(1,3)
```

Program V

Notice the modified DIM statement. We have to tell the micro that we want

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		Element or Column Number		
		1	2	3
Row	1	adj$(1,1)	adj$(1,2)	adj$(1,3)
Number	2	adj$(2,1)	adj$(2,2)	adj$(2,3)

Table III: How adj$(,) works

		Element or Column Number		
		1	2	3
Row	1	hot	hotter	hottest
Number	2	big	bigger	biggest

Table IV: Values of adj$(,) in Program VI

one row of three elements with:

```
DIM adj$(1,3)
```

The first number in brackets tells the micro the maximum number of rows, while the second tells it the maximum number of values or elements, on each of those rows.

Of course we don't have to stick to one layer of three values. We might want another row so we can mention big, bigger, biggest. Program VI does this for us.

```
   10 REM PROGRAM VI
   20 MODE 6
   30 DIM adj$(2,3)
   40 adj$(1,1) = "hot"
   50 adj$(1,2) = "hotter"
   60 adj$(1,3) = "hottest"
   70 adj$(2,1) = "big"
   80 adj$(2,2) = "bigger"
   90 adj$(2,3) = "biggest"
  100 PRINT adj$(1,1), adj$(1,2),
adj$(1,3)
  110 PRINT
  120 PRINT adj$(2,1), adj$(2,2),
adj$(2,3)
```

Program VI

Table III shows how we label the two layers, and Table IV shows the values corresponding to these labels.

We now have two layers of three elements each so our DIM is now:

```
DIM adj$(2,3)
```

Since for these type of arrays we need two numbers in the DIM statement – the first for the maximum number of rows and the second for the maximum number of elements in each row, we call arrays like this two-dimensional.

The first number inside the brackets we call the row number, since it tells us how many rows, or layers, the array has.

The second number, which tells us how many elements there are in each layer, we call the column number. This might seem a little peculiar, but if you look at Tables III and IV you'll see that the elements of each layer form natural columns – and you've got the same number of columns as elements in a layer.

We could have called this second number the element number, but we want to use the word element to refer to each value the array can take.

So *adj$(,)* would be referred to as a two dimensional matrix, with two rows of three columns and six elements in all.

Some people would refer to this as a 2 × 3 matrix, since there are two rows, of three columns and 2 × 3 = 6, the total number of elements in the matrix.

You'll probably remember that the reason we "invented" subscripted variables was so we could use FOR ... NEXT loops on them.

Program VII – again equivalent to Programs III and VI – shows us using two loops. The first prints out the values of *adj$(1,)* (line 110) and the second prints out the values of *adj$(2,)* (line 150).

However this is rather inefficient, as Program VIII, the equivalent of Program VII, demonstrates.

You might say that two dimensional variables such as *adj$(,)* were invented to take advantage of nested loops.

To work out what's happening use our old nested loop trick: work out what's going on in the inner loop for a fixed value of the outer loop.

```
   10 REM PROGRAM VII
   20 MODE 6
   30 DIM adj$(2,3)
   40 adj$(1,1) = "hot"
   50 adj$(1,2) = "hotter"
   60 adj$(1,3) = "hottest"
   70 adj$(2,1) = "big"
   80 adj$(2,2) = "bigger"
   90 adj$(2,3) = "biggest"
  100 FOR loop% = 1 TO 3
  110 PRINT adj$(1,loop%),;
  120 NEXT loop%
  130 PRINT
  140 FOR loop% = 1 TO 3
  150 PRINT adj$(2,loop%),;
  160 NEXT loop%
```

Program VII

```
   10 REM PROGRAM VIII
   20 MODE 6
   30 DIM adj$(2,3)
   40 adj$(1,1) = "hot"
   50 adj$(1,2) = "hotter"
   60 adj$(1,3) = "hottest"
   70 adj$(2,1) = "big"
   80 adj$(2,2) = "bigger"
   90 adj$(2,3) = "biggest"
  100 FOR row% = 1 TO 2
  110 FOR column% = 1 TO 3
  120 PRINT adj$( row%, column%),;
  130 NEXT column%
  140 PRINT
  150 NEXT row%
```

Program VIII

Well, for *row%= 1,* the inner loop (lines 110-130) will print out:

```
adj$(1,1)
adj$(1,2)
adj$(1,3)
```

that is, hot, hotter, hottest. We then drop through to the NEXT of the outer loop and *row%* increases to 2. So the inner loop will then print out:

```
adj$(2,1)
adj$(2,2)
adj$(2,3)
```

printing out big, bigger, biggest.

If you can't see how the nested loops work, try changing the references to *row%* in 100, 120 and 150 to *outer_loop%*. Similarly, change *column%* to *inner_loop%* in lines 110-130. This might make it clearer.

And while you're at it, see what effect leaving out the semi-colon at the end of line 120 has.

Of course we don't have to stick at just two layers with three elements each – or, to use more precise terminology – two rows of three columns. We'll see more of that next month.

For the moment see if you can adapt Program VIII to cater for another row – say, tall, taller, tallest or bad, badder, baddest! Remember, you'll have to change your DIM statement to take account of the increased number of rows.

And, of course, all those *adj$(1,1)* = "hot" are incredibly messy. Try reading in the values of the array from DATA statements. If you're really daring, you'll be able to do it with nested loops!

Well that's all for this month. Next month we'll do some more exploring of our two dimensions.

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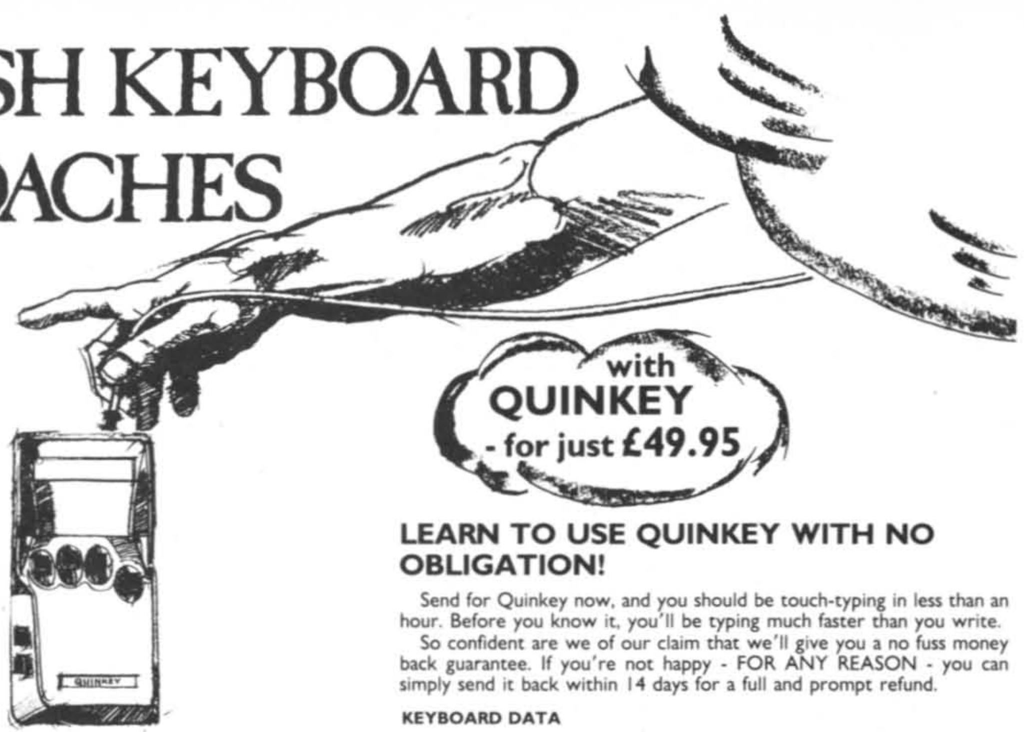

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Quinkey is sold as a complete package ready to be used right away with your computer. Each pack for the BBC contains:

- Quinkey keyboard
- Interface and lead to analogue port of BBC
- Easy to follow self-teach guide
- "PROG" software (a utility program which interprets Quinkey signals to the BBC and gives you a comprehensive alternative/additional keyboard - all inputs except "Break". It merges easily with your application programs)
  "WP" enables you to fully use software such as "Wordwise", "View" and "Edword" for fast and accurate word-processing.

LEARN TO USE QUINKEY WITH NO OBLIGATION!

Send for Quinkey now, and you should be touch-typing in less than an hour. Before you know it, you'll be typing much faster than you write.

So confident are we of our claim that we'll give you a no fuss money back guarantee. If you're not happy - FOR ANY REASON - you can simply send it back within 14 days for a full and prompt refund.

KEYBOARD DATA

Quinkey has five main keys which are pressed in combinations. Signals are sent on release of keys. With the addition of the control key Quinkey takes over all inputs except "break" from the BBC keyboard or can be used in conjunction.

Quinkey casing is made from sturdy FR ABS. Professional quality keys and gold cross point microswitches will give heavy-duty performance.

SOFTWARE DATA

When invoked using CHAIN "WP" or CHAIN "PROG", loads at the current PAGE value and moves PAGE up by 768 bytes. No zero-page locations required. Interrupt service vector IRQ2V, correctly chained. PROG may be incorporated into users' programs without difficulty.

INTERFACE DATA

Quinkey's interface to the analogue port of the BBC is a four-channel connector which allows up to four Quinkeys to be used simultaneously with one micro. (For further information about the Educational Pack of four Quinkeys and schools software, tick the appropriate box in coupon)

TESTED COMPATIBILITY

BBC model "B" OS 1.2 BASIC I or BASIC II (unless using INKEY with negative argument), DFS 0.90. View A1.4, Wordwise 1·17, Edword.

FOR COMPREHENSIVE REVIEW OF QUINKEY SEE ACORN USER, SEPT '84

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Please allow up to 28 days for delivery. Reg. no. 137 4069 **MU1/5**

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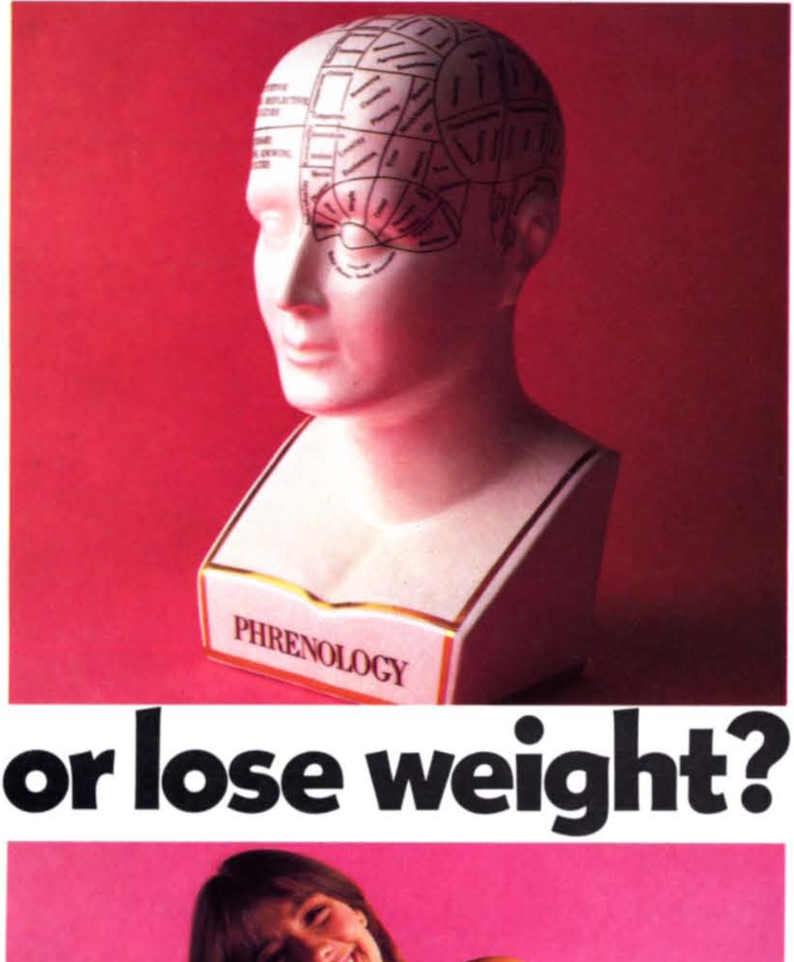

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Home computing isn't all fun and games. The Mirrorsoft Home Discovery series of software programs can help broaden your knowledge and experience or even assist you to lose weight.

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How strong are your Psi powers? This intriguing and comprehensive package, by Prof. Hans Eysenck and Carl Sargent is based on their book published by Michael Joseph. It checks for and helps develop latent Psi ability in individuals or groups of individuals – notably clairvoyance, recognition of hidden objects or symbols, and precognition, foretelling future events.

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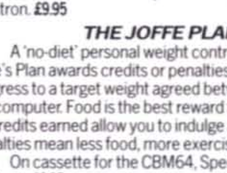
Star Seeker accurately plots the most prominent stars from any position on Earth; at any time in this or the next century. You can obtain information on individual stars, and draw constellations. Solar System plots Planets and Halley's Comet, with us next year!

On cassette for the BBC B (Spectrum 48K and CBM64 versions coming soon). **£9.95**



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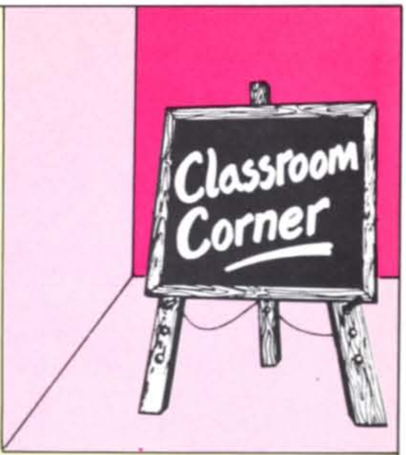
MATCHMAKER

A shape-recognition game for pre-readers

by ROLAND WADDILOVE



MATCHMAKER is an entertaining and educationally valid way to give pre-readers practice in shape recognition.

The child is shown a menu which allows him to choose between upper or lower case letters, or shapes.

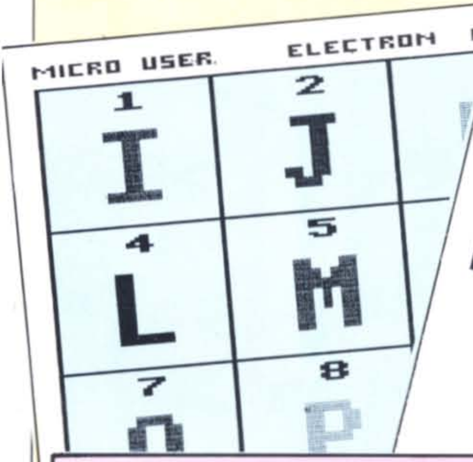
Whichever selection is made, a group of nine shapes is printed in a three by three numbered grid. One of these shapes is duplicated at the bottom left hand corner of the screen.

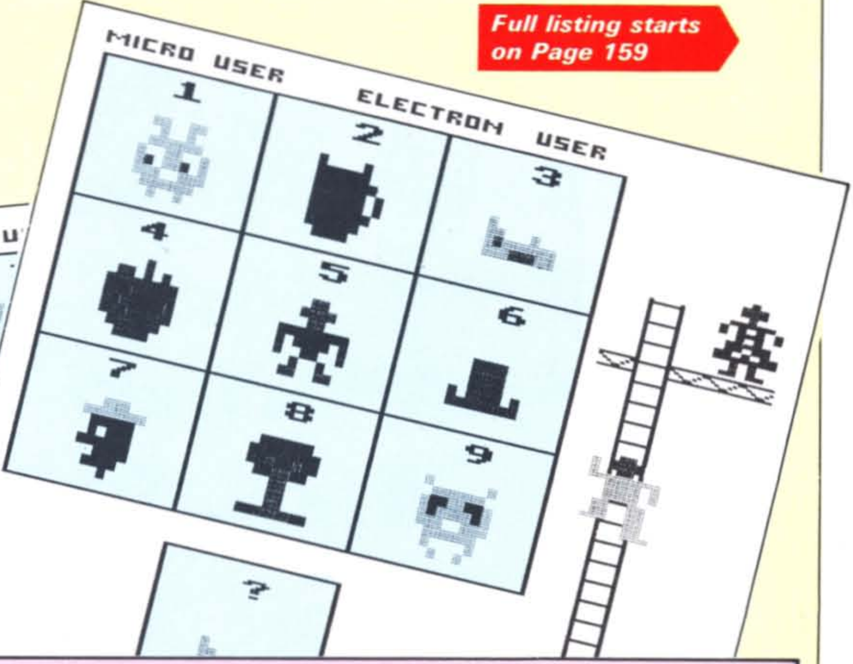
All the child has to do is to match it with the shape in the grid by selecting the appropriate number.

To add to the fun we have separated an intrepid Romeo from his Juliet by a first floor balcony, as the course of true lover never runs smooth!

Naturally we have provided him with a ladder but he can only ascend this step by step as the micro receives correct answers.

Full listing starts on Page 159





PROCEDURES

PROCassemble	Assemble the machine code for the large letters routine at &900.
PROCinitialise	Switch off the cursor keys, Esc and auto repeat, set the flash rate of colours 8-15. DIM the arrays to store notes of the tune and colours.
PROCmove	Called if PAGE>&E00, moves the program down in the memory to &E00, otherwise there is not enough room.
PROCpics	Define the characters used for the pictures.
PROCtitle	Define the characters used for Micro and Electron User.
PROCchars	Define the characters used for the man, ladder, girl and so on.
PROCtune	Plays the tune.
PROCinstructions	Print large title and instructions for parent or teacher. Choose type of question.
PROCscreen	Draw grid and letters or pictures, draw man, ladder and girl.
PROCman	Erase man at old position, draw man at new position.
PROCquestion	Ask the question – draw either a picture or letter in the box at the bottom.

VARIABLES

X%, Y%	Coordinates of the man.
note%(8)	Stores the notes of the tune.
colour% (24)	Colours of the 12 pictures, two colours each.
I%,J%	Used as general variables, loops and so on.
capitals **lowercase** **pictures**	Flags to show the type of question.
man	type of man flag, +1 or −1.
B%	&900 – code for BIGTYPE.
H%	Height of large character.
W%	Width of large character.
BIG$	Large character(s) to be printed.
answer	Which picture or letter chosen.
A%	Base for selection of pictures or letters.

Your
Christmas Day
Program
Guide

Acornsoft announce tidings of great joy for both BBC Micro and Electron owners: eight brand new programs for Christmas.

Each one makes an ideal stocking filler.

They're all available at your local Acornsoft stockist. For the address or to order by credit card simply ring 0933 79300.

Or you can send off for our catalogue by writing to Acornsoft, c/o Vector Marketing, London Road, Wellingborough, Northants NN8 2RL.

Alternatively, however, you could always take a chance and drop a line to Father Christmas.

ACORNSOFT
Software for the BBC Micro and Electron.

9.00 Firebug

A fast moving arcade-type game in which you are a fireman, trying to rescue some oil drums and take them to the safety of a water tank. Your opponent is the firebug who runs around lighting fires which move slowly towards the drums and fire extinguishers, destroying them if contact is made.

10.00 Maze

A gripping graphics game where you enter a top secret installation with the aim of stealing secrets from a rival company. The security system, however, has many levels each consisting of a maze of corridors patrolled by armed robot guards. Complete with full colour 3-D graphics, sound effects and a high score table.

12.00 Elite

A superb 3-dimensional graphics game that's light years ahead of any other. You are a space trader who roams the universe, making your living from buying and selling cargo in your Cobra space craft. On your travels, you will encounter aggressors who are eager to put an end to your dealings. Be warned, only the fittest will survive.

1.00 Crazy Tracer

A crazy adventure in which you guide a paint roller round the edge of a maze of rectangles, while avoiding the monsters which are trying to stop you by crushing the roller. Beware – as the game progresses, so the number of monsters chasing you will increase.

3.00 Go

'Go' is a board game for two players which originated in China 3000 years ago and is now more popular than Chess in the Far East. It requires strategic insight, intuition and a strong, calculating mind. If you wish, you can also challenge the computer at differing degrees of difficulty. A velly good game indeed.

4.00 Watch Your Weight

At last, a weight-loss program designed especially for you. With it, your computer becomes an expert wholly conversant with and sympathetic to your needs, and will help you choose an appropriate and individual weight-loss plan. The program also includes a calorie counter and a series of apposite menu suggestions to help stimulate your imagination when you just can't think what to eat.

5.00 The Complete Cocktail Maker

With everything from a Black Russian to a Betsy Ross, this program contains data sufficient to concoct a staggering 320 different cocktails.

6.00 Paul Daniels' Magic Show

Stun and amaze your friends with your astounding feats of magic. This program contains ten tricks to be performed by or with your BBC Micro/Electron. Hurry though – it's bound to disappear fast.

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(Authorised BBC Micro Dealer, and Econet service centre)

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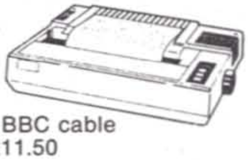
RX-80FT £208.00 + VAT

FX-80 £312.42 + VAT



Printer price includes paper and BBC cable
Screen dump rom available for £11.50

TAXAN/KAGA * KP810

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3″ Micro Disc £89.00
(inc. VAT)

Disc Interface & Drive
£181.30 (inc. VAT)

Micro Disc Drive for the BBC Micro

The Micro disc drive offers a method of low cost quick access to programs. The drive is essentially a small version of a 5¼″ disc drive and offers similar features to the larger drive.
The data is stored on a 3″ disc, this is enclosed in a protective hard plastic cassette which features a write protect switch.
The micro drive requires the standard Acorn disc interface, but a new disc filing system rom. Acorn DFS may be exchanged for the micro DFS for £2.30. The new micro disc filing system can read and write to Acorn DFS discs.
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Capacity: 80.64 K bytes **Transfer Rate:** 125k bit/s.

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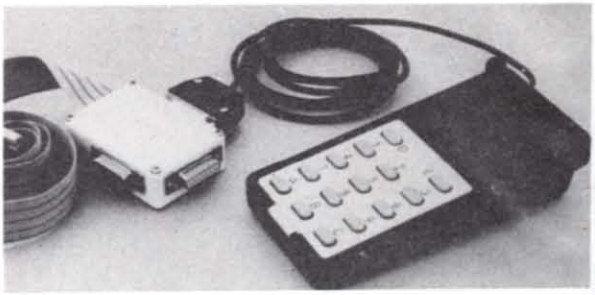

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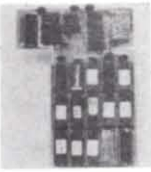
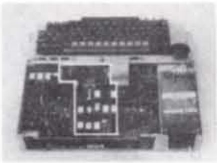
SIDEWISE



SIDEWISE FITTED



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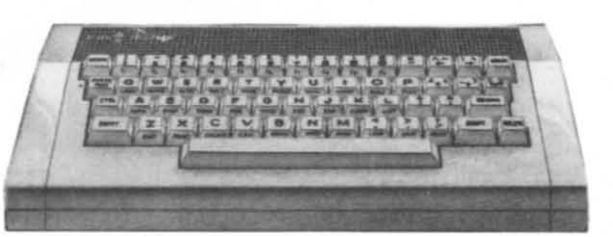

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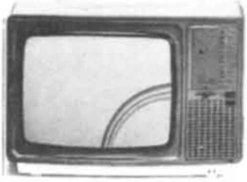

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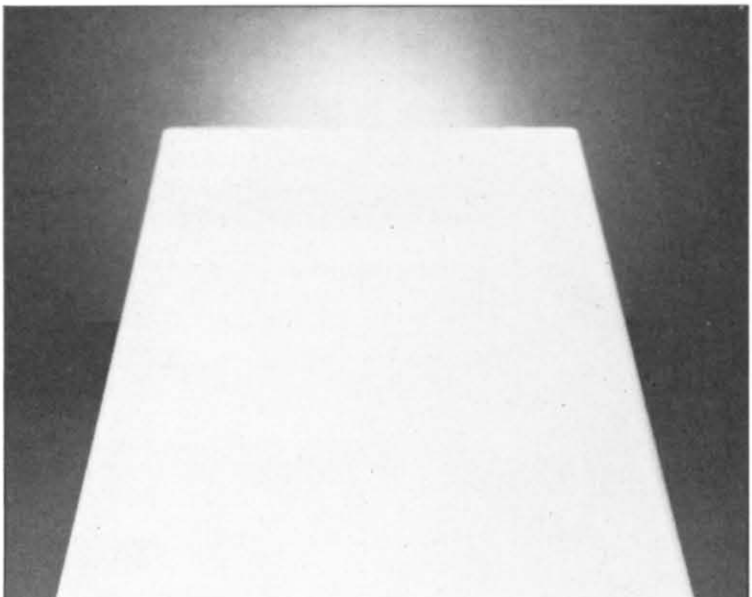

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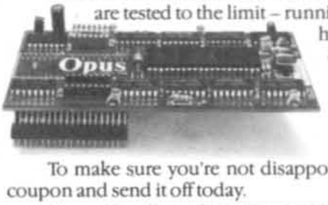

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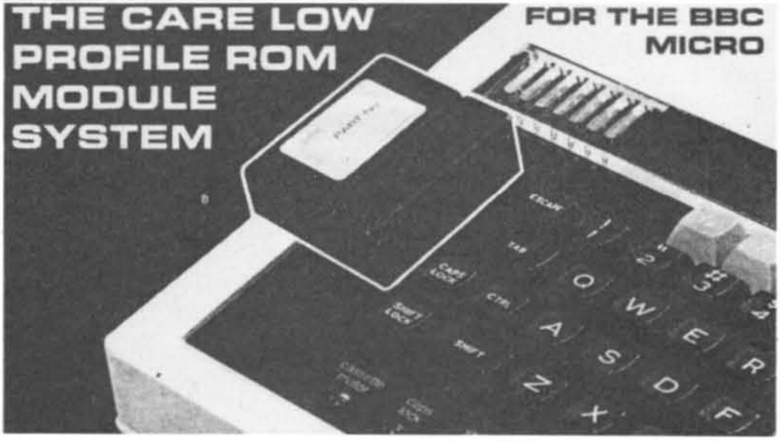

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MIKE COOK'S PROBLEM PAGE

Crowded out by the short printer lead

MY *Micro User* just fell off the table again because I am getting crowded out by my FX-80 printer plus the space needed for its paper supply.

The answer is to move the printer off the work table, but the problem is a short lead from my BBC B to the printer.

All of my BBC plus Epson owning friends (and a snooty IBM PC owner) have this problem.

When I purchased the printer, I was told by Watford that a three foot lead was the recommended length, although I notice they now advertise a five foot lead.

I find this means the printer is extremely close to the micro – there is certainly no scope for a plinth with the paper underneath.

Examination of advertisements for computer desks suggest that much longer leads are permissible, or that there are no cables connecting the stylishly arranged equipment on them.

I have searched, in vain, the pages of *The Micro User* for recommendations on parallel printer cable lengths. Thus I wondered if you would make a recommendation on the maximum and/or optimum printer cable length.

Also, if true, a short explanation as to why long leads are unsuitable for parallel operation of a printer would be interesting. – *D. Bilney, Dhahran, Saudi Arabia.*

● Very long leads are not suitable for printers because they are only driven by TTL logic. Therefore a long lead has a greater tendency to pick up interfering signals and atenuate the wanted signals.

There is also a tendency for all the bits to arrive at a slightly different time thus skewing the data.

That said, I have used a 15 feet printer lead without any difficulty – it's a case of trying what will work in your location.

Remember ribbon cable is quite expensive and the shorter the lead supplied, the cheaper it is – or the more profit is made.

Sounds like the alignment

MY BBC Model B (1.2 OS, Basic II and Wordwise) was bought in February this year and up to approximately three weeks ago has given me no trouble.

Since then I have had considerable problems loading programs from cassette. None of my commercially written software – including the Welcome demonstration cassette – will load, nor any of my own programs or Wordwise files written prior to that time.

They either produce no response or give garbled headers and "Data?" or "Block?" messages.

However, programs written since that time load as normal with no problems.

I have re-typed some of my own programs from their listings and these load without any trouble.

At first I suspected the tape recorder (a Ferguson 3T27) but I have since tried a different one without success and in any case the fact that I can try "old" and "new" tapes of the same program immediately after each other without changing anything else (including the volume setting), the new one loading and the old one failing, suggests that the problem lies elsewhere.

Has my Beeb developed a fault or is the problem more elementary? – *P. Sargent, Sheffield.*

● It sounds like your head alignment has shifted. Possibly the tape recorder was subject to a knock or a fall. This would give exactly the symptoms you complain of.

You can adjust it back, but note that none of your new programs will load after adjustment.

Lock lights stay on

MY BBC Micro Model B has suddenly developed a fault in that the caps lock and shift lock lights remain on when the machine is switched on.

This is accompanied by a continuous tone from the speaker. Pressing Break does not have any effect on the tone or lights but does allow partial use of the keyboard.

Does this tie in with "losing confidence" in your July issue of *The Micro User?* As I am based in Ghana you will appreciate the difficulty in dealing with the problem by taking the machine to a service agent. – *Paul Ramsay, Leymot, Ghana.*

● The fault you describe can be caused by one of many things going wrong. Without a proper examination of the micro with test equipment it is impossible to "point the finger" anywhere. It could be just about any component in the system.

Just a bit too late

I HAVE designed, but not yet built, a frequency counter which interfaces to the Beeb via the user port.

The micro is needed because the frequency meter measures the period of the input waveform.

This gives better accuracy at the lower frequencies, but means that a ratio of two numbers must be calculated before the frequency can be displayed. The component cost is about £15.

Assuming of course that the design works would you con-

→

You've got a problem with your micro and you just can't sort it out on your own? Then write to MIKE COOK. If he can't help then probably no one can . .

IF you have a technical query for this page, send it to Mike Cook, *The Micro User,* Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 197.

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sider publishing it, possibly in the Body Building Course series? I stress the word consider, because I know that I haven't provided you with a lot of information.

I just wanted to know if the project is of sufficient interest, and if you accept this type of article from your readers. – *C. Attenborough, Monks Hill, Ensworth.*

● **Thanks for the offer, but as you have seen we have already printed a frequency meter. If yours has more to offer, then write again and tell me of the differences.**

Outputs to inputs

I'M extremely interested in your Body Building Course Number 17 (*The Micro User,* August 1984) as I need output control lines without use of the user port (where there is a speech synthesizer connected).

Although I have long experience in electronics, I am a Beeb novice.

Therefore I would be most grateful if you could tell me, what are the criteria for connecting the link on IC4 – in simple language, please – and how do I make all the lines outputs instead of inputs?

Also, how do I address a line to turn it on – that is, what is the equivalent to, for example, ?&FE60=?&FE60+4 when using the user port?

I am sorry to be so ignorant, but making the board and interfacing to external equipment will be child's play to me. However, my knowledge about the Beeb's registers is in its infancy as yet. – *Bill Garfield, Maidenhead, Berks.*

● **Table II in my article showed the effect of the address select link. It moves the address of the extra ports.**

This is so that you can avoid clashing with anything else you might have connected to the 1MHz bus. You use the extra ports in exactly the same way as you use the old port.

So to make a line an output you write a 1 in the appropriate bit in the data direction register. This was explained at length in the July and August 1983 issues of *The Micro User.*

Let us say we put the address link at position 4 the new VIAs are mapped to &FC80 to &FC9F. Therefore to perform the equivalent operation you asked would be:

Ext socket	*Operation*
A	**?&FC80=?&FC80+4**
C	**?&FC90=?&FC90+4**

Extension socket B and the aux I/O connector are on the A side of the VIA and the equivalent operation would be:

Ext socket B	**?&FC91 =?&FC91+4**
AUX I/O	**?&FC81 =?&FC81+4**

For a good description of all the VIA registers, see the Advanced User Guide.

Olympics on disc

HOW can I put my Micro Olympics on disc? I use Disc Executor from Watford Electronics to put my locked tapes to disc.

I can put all my locked tapes to disc except two programs – Micro Olympics and Aviator.

Can we expand the BBC's memory because the pins 4 and 6 from IC-45 (74LS139) are not used, and also because the video chip (6845) can handle 512 RAM? – *Bert M. Harms, 7815 AZ Emmen, Netherlands.*

● **The best way to get Micro Olympics onto disc is to buy it on disc. You see it is far too easy to copy it when it is on disc without any disc protection.**

As the lads who wrote it work in the next office it is not really practical for me to reveal its protection methods – sorry.

The memory cannot be expanded because of the limit of the 6502 microprocessor. It matters not that the video controller can display more memory (it can't actually without redesigning the circuitry around it).

Therefore barring paged memory or second processors, there is no way of increasing the BBC Micro's memory.

Clicking ... they all do it!

I USE my micro with a cassette recorder which does not have remote motor control. When I am loading a program I get a loud metallic click (like a relay contact click) coming from the centre back of my micro, at approximately one block intervals.

Is there a fault or is there a way of turning this off?

I have had my micro since March, 1982 and have updated to 1.2 OS. The clicking noise has always been present and up to recently (when I borrowed a friend's cassette recorder with remote motor control) I believed it was caused because I hadn't a remote motor control cassette.

The clicking continued with the cassette with motor control in use. – *Raymond W. Chubb, Plymouth, Devon.*

● **All BBC Micros click when loading in a program. It is, as you said, the cassette motor control relay.**

The fact that you do not need this is not known to the micro and so it merrily goes on turning the relay off after each block.

Then when it finds out that it was not the last block it turns it back on. Hence the clicking.

Refer to Mr Bishop

I HAVE built the Eprom programmer out of the book Simple Interfacing Projects by Owen Bishop.

While the circuit itself was simple enough, I have found the software to run it rather more difficult.

Can you or anyone else help! – *G. Hall, South Croyden, Surrey.*

● **If Owen Bishop designed it, I think it is up to him to supply the software. I am sorry I have never seen the book so I can't help.**

Not a job for the inexperienced

THIS month my BBC Micro went wrong. There was no screen display, the keyboard had no effect and the only sound was a stuttering to accompany the flickering caps lock light.

Thanks to the shop extending Acorn's measly guarantee to a year, it only cost me frustration for a week having no micro.

The shop said that the power supply module had to be replaced.

Do you know what could have been wrong – in case it should fail outside guarantee.

There are several things I am worried about. Perhaps you can help:

On switch on, the screen display takes longer to settle down. Has the new power supply – or the fault in the old one – damaged the modulator?

The micro gets fairly warm in operation. Is this normal – or must I expect another failure soon.

Perhaps your can tell me what Acorn mean by "sufficient ventilation" being available. At the moment the minimum space between the sides of the micro and the desk is just under ½". Is that enough?

There is not much clearance as you know underneath. – M.J. Cowie, Norbury, London.

● **It could be just about any component in the power supply and fixing it is not a job for the inexperienced.**

The longer ON time is probably caused by the different power supply but is nothing to worry about.

Also some supplies run hotter than others – it's just component tolerance spread and is inevitable with any mass produced equipment.

Adequate ventilation is a vexed problem but can be improved if the bar at the back of the inside of the lid is removed.

This bar is on some newer micros and has been produced to prevent tiny fingers "posting" things through the slot.

The result is inhibited air flow which can lead to overheating in some circumstances.

EDWARD JOHNS concludes his review of Basic I and II

Simplified assembling with Basic II

IN last month's article we went through the main differences between the Basic commands on the two versions of Basic. As promised, we will now examine the differences between the assemblers.

The four new commands in the assembler are the equate functions shown in Table I. They allow bytes and strings to be included in assembly programs by using a single command – typically they are used to store data in the program you're assembling.

On Basic I you had to come out of the assembler, poke the bytes in with an indirect operator, increment the program counter by the relevant amount, then re-enter the assembler resetting the selected options – a long winded procedure.

One point to note is that the EQUS does not put a CHR$ 13 at the end of the string as with the string indirect operator. Also all of the equate functions add the number of bytes they have taken up to the program counter P%.

Consider the Basic II program shown in Program I:

```
100 FOR pass=0 TO 3 STEP 3
110 P%=&B00
120 [OPT pass
130 LDY#0
140 .Label LDAString,Y:BEQEnd
150 JSR&FFEE:INY:BNELabel
160 .End RTS
170 .String EQUS"Micro User"
180 EQUB 0
190 ]
200 NEXT
210 CALL&B00
```

Program I

When run the message *"Micro User"* is displayed on the screen. The EQUS in line 170 puts the Ascii values of the string into memory starting from the address given by the variable *String*. The EQUB in the next line is used as a terminator.

The example in Program II shows one method of simulating the equates on Basic I using indirect operators. As you can see this method is rather messy.

```
100 FOR pass=0 TO 3 STEP 3
110 P%=&B00
120 [OPT pass
130 LDY#0
140 .Label LDAString,Y:BEQEnd
150 JSR&FFEE:INY:BNELabel
160 .End RTS
170 .String :]
180 $P%="Micro User"
190 P%=P%+LEN($P%)
200 ?P%=0
210 P%=P%+1
220 NEXT
230 CALL&B00
```

Program II

Routines which frequently use this method become very untidy, this is because the assembler must be exited and entered each time the indirect operators are to be used.

To allow Basic I owners to use the equate commands tidily, I have written macros which perform the same operation.

Now all we need to do is to interface the assembler and the macros. This is done by using the OPT command followed by the required macro function.

Table II contains the macros which are used in place of the equates.

EQUB	&xx	Add a single byte.
EQUW	&xxxx	Add a word, two bytes.
EQUD	&xxxxxxxx	Add a double word, four bytes.
EQUS	"string"	Add a string, no of bytes depends on length.

Table I

EQUB

```
DEFFNEqub(byte)
?P%=byte
P%=P%+1
=pass
```

EQUW

```
DEFFNEquw(word)
!P%=word AND &FFFF
P%=P%+2
=pass
```

EQUD

```
DEFFNEqud(double)
!P%=double
P%=P%+4
=pass
```

EQUS

```
DEFFNEqus(string$)
$P%=string$
P%=P%+LEN(string$)
=pass
```

Table II

Remember the program to print *"Micro User"?* Program III is a Basic I equivalent using these macros.

In addition to its new equate functions the Basic II assembler also allows code to be assembled into one area of memory while being set up to be executed at another address.

One application where this might be necessary is in writing sideways ROM software.

This of necessity starts at &8000. You can't assemble code there, though,

→

From Page 93

since to use the assembler the Basic ROM is "paged in" at &8000. So you have to write your code somewhere else in RAM. But you still need it to be written as if it were at &8000 to get all your addresses referring to the right locations!

We're used to using P% for the program counter in standard Basic I fashion. Basic II introduces O%, as well.

```
100 FOR pass=0 TO 3 STEP 3
110 P%=&800
120 [OPT pass
130 LDY#0
140 .Label LDAString,Y:BEQEnd
150 JSR&FFEE:INY:BNELabel
160 .End RTS
170 .String OPT FNEqus("Micro User")
180 OPT FNEqub(0)
190 ]
200 NEXT
210 CALL&800
220 END
230 DEFFNEqus(string$)
240 $P%=string$
250 P%=P%+LEN(string$)
260 =pass
270 DEFFNEqub(byte)
280 ?P%=byte
290 P%=P%+1
300 =pass
```

Program III

O% holds the origin address – this is where your code is actually assembled in memory.

P% still refers to the program counter – the code is assembled as if it were at P%.

Bit 2 of the pass number determines whether the code will be assembled at P% or O%.

OPT	Assembled at O%	Errors reported	Listing produced
0	X	X	X
1	X	X	√
2	X	√	X
3	X	√	√
4	√	X	X
5	√	X	√
6	√	√	X
7	√	√	√

Table III

If bit 2 is set then the code is assembled at O% otherwise it is assembled at P%.

Table III shows the eight options available on Basic II. Basic I only allows options 0 to 3.

Program IV is an example showing how O% and P% are used together. Set PAGE to &1900 before typing it in if you do not have a DFS (Disc Filing System).

The program is assembled into memory at &7000 but has been coded to execute at &E00.

To test the assembled routine we must copy it from &7000 to &E00. This is done in lines 230, 240 and 250. This moves the object code to its true execution address. Calling &E00 executes the code.

Disc users would have been unable to save the object code if it had been assembled at &E00, but the code at &7000 can be saved without corrupting it. This can then be downloaded to &E00 when required.

```
100 MODE7:HIMEM=&7000
110 FOR pass=4 TO 7 STEP 3
120 O%=&7000
130 P%=&E00
140 [OPT pass
150 LDY#0
160 .Next LDAMessage,Y
170 BEQEnd
180 JSR&FFEE:INY:BNENext
190 .End RTS
200 .Message EQUS"Executes at &E00"
210 EQUB0
220 ]NEXT
230 FOR loop%=0 TO (O%-&7000)
240 loop%?&E00=loop%?&7000
250 NEXT
260 CALL&E00
270 END
```

Program IV

Well that's the end of this review of the major differences between Basic I and Basic II, and I suppose I'd better answer the question all the Basic I owners will be asking:

Is it worth upgrading to Basic II?

The answer is, if you're simply a Basic programmer, you probably should – though it's not vital.

If you use assembly language, then definitely, go ahead and get it.

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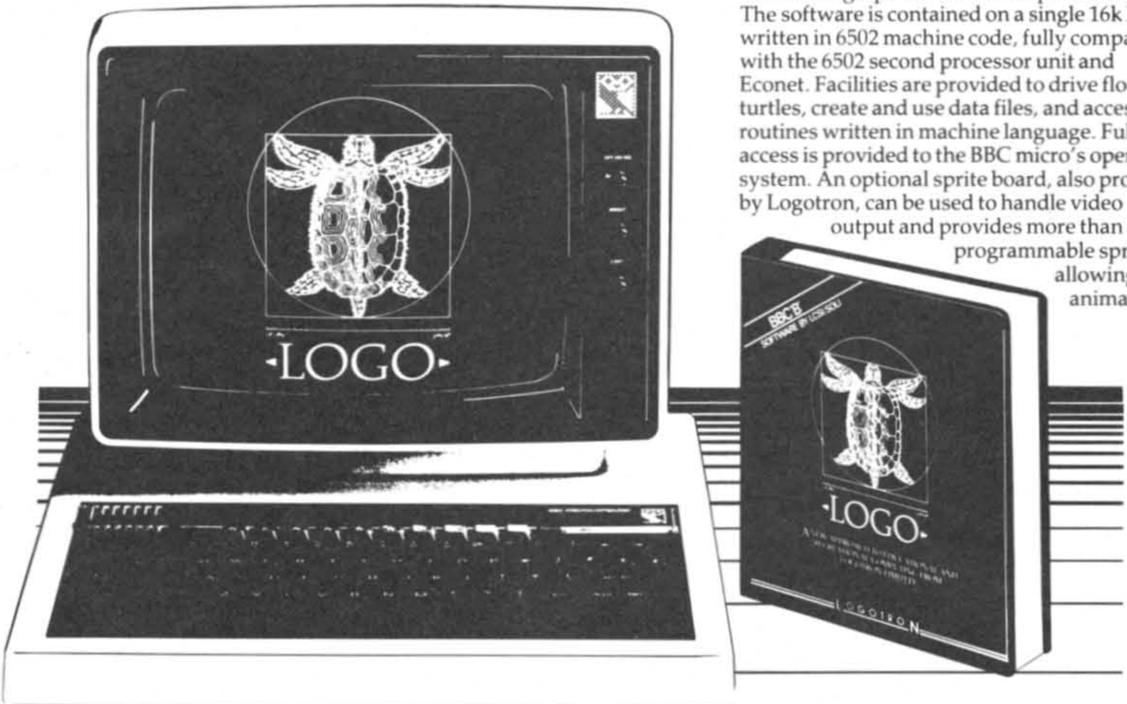

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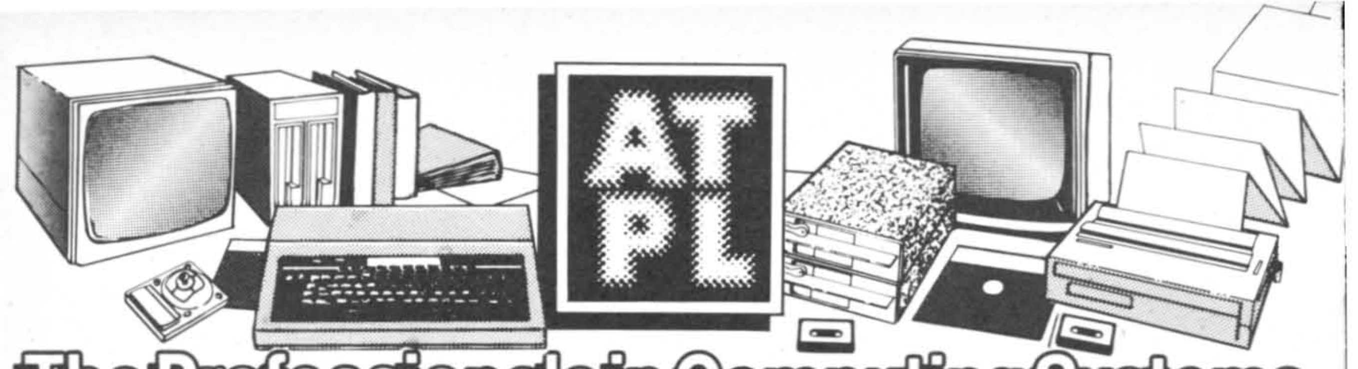

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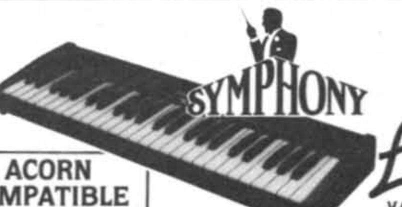

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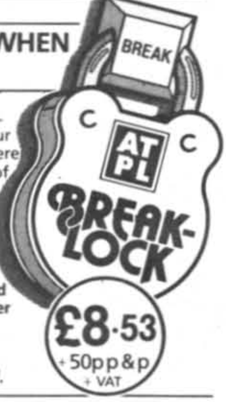

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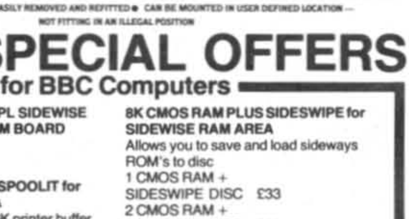

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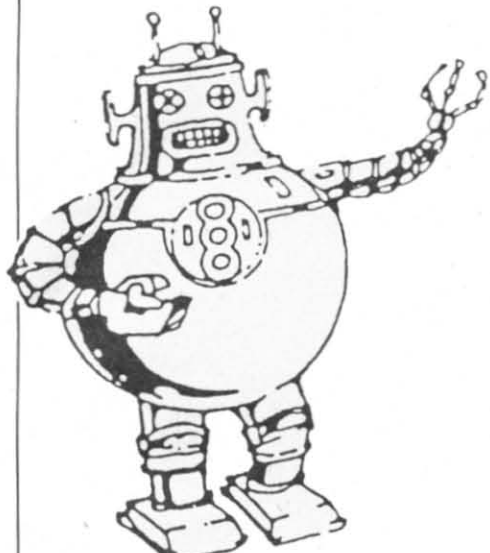

Get your message over easily in machine code

ONE of the nice things about programming in Basic is that if you want a message to appear on the screen all you have to do is type:

```
PRINT "Message"
```

Often such messages are vital. At the very least, they can make the difference between a program being either user friendly or a brain-teaser.

The trouble is, providing these helpful prompts in machine code programs can often be a fiddling process, involving poking messages on to the screen byte by byte.

With the BBC Micro the main drawback was its lack of a simple means of inserting the required message into an assembly.

Let's face it, all this closing the assembly with a square bracket, using $P% to store the message string, increasing P% by LEN($P%) and opening the assembly again was just too much bother.

And that was a pity, since I had a neat message-writing routine I'd been using for years on the 6502 and Z80. But what it needed was a decent way of getting strings into an assembly.

Then came Basic II with its EQUS statement, and all was bliss!

The program listed on the next page was the immediate result of my getting my hands on a Basic II chip.

The idea behind it is simple. When you jump to a subroutine with a JSR, the 6502 pushes the address of what it assumes to be the next opcode onto the stack – MINUS ONE.

That is, if the assembly were:

```
3000  20 00 34  JSR &3400
```

the address of the memory location containing "34" would be pushed on to the stack – hi byte first.

So when the 6502 encounters a JSR on to the stack would go &30 followed by &02.

To get the address of the next opcode or whatever after the JSR you would pull the lo byte off the stack, followed by the hi byte and then increment the resultant address by one.

This is what an RTS does automatically, so the 6502 returns to the correct address after a subroutine.

Normally, of course, this return address as it is known would contain an opcode and the program would continue where it had left off before the subroutine call – in much the same way as a Basic program would after completing a procedure call.

However in this program immediately after the JSR I put the message I want to output.

When I jump to the subroutine that prints this message – called, not unnaturally, *print_chars* – I pull the return address from the stack and increment it by one – only I store the resulting address in *next_byte* instead of returning to it as I would with an RTS.

The point is that, since I've stashed the message I want to print out immediately after the JSR, *next_byte* will now point to the first character I want to print out.

(Remember, *next_byte* should be considered as a pair of bytes pointing to a particular byte in memory. Such a pointer is called an indirection.)

I then take the contents of the address pointed to by *next_byte* and print it out using OSWRCH.

Then I increase the address indirected by *next_byte* by one so that it points to the next character, print that out, and so on until I reach an asterisk.

That is, *next_byte* points to the character I'm printing out. Once I've done so, I increase it by one, to point to the next character to be printed.

I've used an asterisk as my end of message marker. When I reach it I don't print it out. I do, however, carefully put its address on the stack, hi byte first then lo byte.

Since the * marks the end of the string I've inserted into the assembly with EQUS, the byte after it contains the next opcode of my machine code program.

Now, since an RTS causes the processor to go to the address held on the stack PLUS ONE, you can see how, by branching to an RTS immediately after I've encountered the asterisk I can return to the main program at exactly the right place – at the opcode after the asterisk.

You see, since the address on the

→

From Page 97

stack points to the asterisk when you increase it by one, as the RTS does automatically, it points to the right byte – the next opcode, which is after the asterisk. From then on the main program continues as normal.

By the way, once I've detected the asterisk (lines 290,300) I don't go directly to an RTS but print out a carriage return and line feed first (lines 340-370). You can omit this if you wish.

Also I've used Y in an interesting way to simulate indirect absolute addressing – a mode not normally allowed on the 6502 save for the JMP instruction.

After carefully saving Y on the stack (AFTER the JSR has stored its bytes on the stack) I set Y to zero.

Remember, the address of the byte I'm interested in is stored in *next_byte*, in page zero.

So if Y is zero, then:

LDA (next_byte),0

loads the accumulator with the contents of the address indirected via *next_byte*.

When I move on to the next location I do it by increasing the contents of the *next_byte* pair – not by increasing Y.

After reaching the asterisk I reclaim the value of Y from the stack before pulling the bytes I need to calculate my return address.

Take a look through Listing I. It's fully annotated, so it shouldn't be too difficult to follow.

Admittedly, it doesn't do anything too exciting, just printing out:

One
Two
Three

as example messages. (You can make it a bit more spicy if you like . . .)

The main program is in lines 130-170 and the subroutine we're interested in is in lines 180-440. You should be able to fit it into your own programs easily. It destroys A, but preserves X and Y.

Notice the SEC followed directly by the BCS of lines 320-330. This is just a machine code implementation of an unconditional branch – similar to Basic's REPEAT . . . UNTIL FALSE.

Well that's one of my favourite machine code tricks off my chest. I hope you find it as useful as I have.

If you have any pet machine code routines, why not send them in for the rest of us to share?

```
   10 REM Basic II version (c) Micro User
   20 REM This program allows you to print out a string in the middle of a
bunch of machine code using
   30 REM EQUS and a machine code routine. NB Call the routine before the EQUS.
Prog continues after the EQUS.
   40 REM Also puts the message on a new line. A destroyed, X and Y preserved.
   50 REM String must be terminated by an asterisk. There's an automatic line
feed and CR.
   60 MODE 3
   70 DIM code% 255
   80 OSWRCH=&FFEE
   90 next_byte=&70                     : REM points to next byte
  100 FOR pass%=0 TO 3 STEP 3
  110 P%=code%
  120 [
  130 OPT pass%
  140 .start JSR print_chars:EQUS "One*" ; These are the test messages.
  150 JSR print_chars:EQUS "Two*"       ; Notice how we jump to the routine
  160 JSR print_chars:EQUS "Three*"     ; print_chars BEFORE each message.
  170 RTS                               ; End of main program
  180 .print_chars PLA                  ; The stack contains the address of
  190 STA next_byte                     ; the instruction after the JSR
  200 PLA                               ; minus one. So you must increase it
  210 STA next_byte + 1                 ; to point to the next "free" byte.
  220 TYA                               ; Preserve Y register
  230 PHA
  240 LDY # 0                           ; In effect ensures indirect absolute.
  250 .print INC next_byte              ; Move onto the next byte
  260 BNE skip                          ; IF next_byte goes past 255 to 0
  270 INC next_byte + 1                 ; increase next_byte + 1 ELSE skip
  280 .skip LDA (next_byte),Y           ; Get the next byte indirectly.
  290 CMP# ASC("*")                     ; Check to see if it points to the end
  300 BEQ finish                        ; of message. If so finish ELSE write.
  310 .write JSR OSWRCH
  320 SEC                               ; Deliberately rig it so we jump back
  330 BCS print                         ; to the start of the print routine.
  340 .finish LDA#13                    ; Tidy up by sending a carriage
  350 JSR OSWRCH                        ; return and line feed.
  360 LDA#10
  370 JSR OSWRCH
  380 PLA                               ; Retrieve Y register from stack.
  390 TAY
  400 LDA next_byte + 1                 ; Carefully push address of the next
  410 PHA                               ; byte onto the stack hi byte first.
  420 LDA next_byte
  430 PHA
  440 RTS                               ; RTS will increase it past the *
  450 ]
  460 NEXT
  470 PRINT '' "Press any key to run code." ''
  480 dummy$ = GET$
  490 CALL start
```

Listing I

IF you're a machine code programmer, or just getting round to machine code for the first time, you'll almost certainly want to use the extra facilities Basic II offers – as the above routine illustrates.

If you haven't got Basic II in your micro, why not take advantage of our special offer? It's on Page 94.

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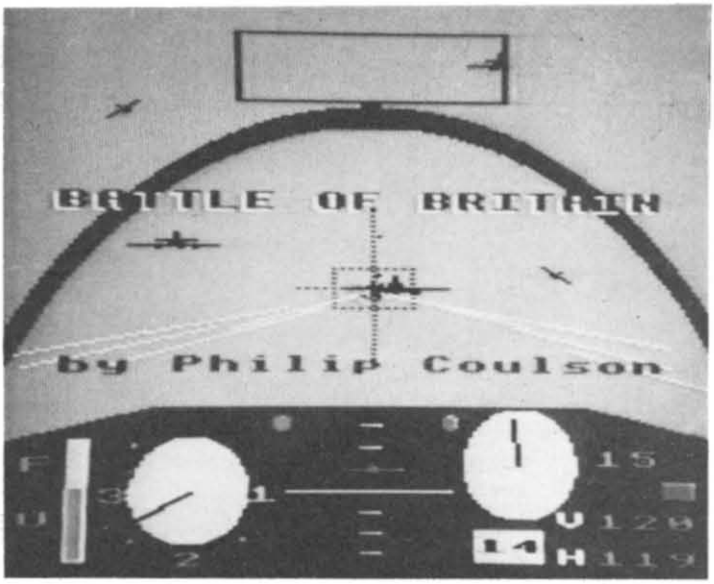

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Watch out! Your mirror tells you there's an Me109 on your tail. You see the flashes and hear the chatter of his guns. You dive steeply away, and manage to shake him off. A Hurricane fills your sights and you almost open fire on him. That could have cost you a lot of points! Planes zoom towards you and climb and dive around you as you seek out your next target. A slow-moving Stuka falls easy prey to your guns and with your low ammo warning light flashing, you carefully aim your last few rounds at a fleeing Junkers 88.

You throttle back to conserve your dwindling fuel supply and set a course for home. From time to time, clouds blot out your view of the horizon and you are dependant on your instruments. With the airfield in sight you lower your flaps and gear and side slip gently to line up with the runway. Although you have survived another mission, you cannot afford to relax yet, and the quality of your landing can win or lose you points.

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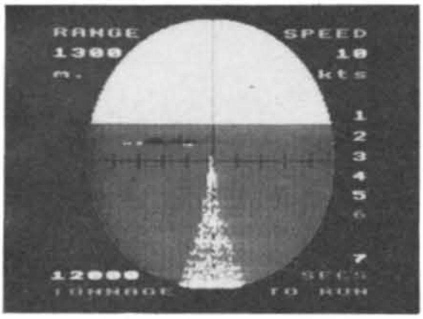

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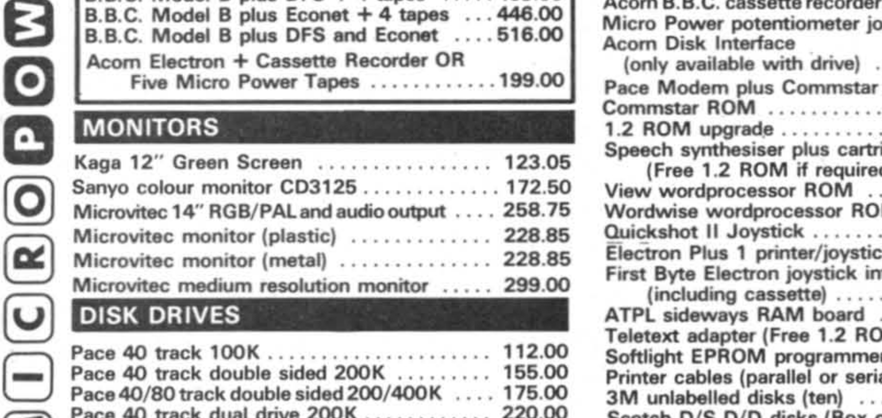

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Text printing too fast? Graham Walkden offers a program that lets you . . .

Take a brake

ONE of the few endearing features of the Apple II is its ability to change the speed of printed text. This can be a great help when using the trace facility, and is useful for slowing down the speed of printed text for instructions for a game and so on.

Speeded Text is an assembly language/Basic program for the BBC Micro which will do just that. To run it, type PAGE=PAGE+256 – to accommodate the machine-code – then type it in.

To operate the program type PROCSPEED(speed) where speed is the delay between characters printed (0 minimum, 255 maximum). Alternatively just type RUN and the program will demonstrate itself.

If you use this routine in one of your programs, ensure that one of the first lines is this:

```
CLS: 0%=0: PROCSPEED(0): CLS
```

This line initialises the system.

The program utilises what are called vectors, memory locations which contain pointers to another location. By addressing the vector the memory location can be ascertained and appropriate action taken.

This may not sound terribly useful, but most of the operating system routines are vectored in this way. This means that if one changes the value of the vector one can point the operating system to a totally different routine.

In this case we have re-vectored the operating system print routine, OSWRCH (Operating System Write Character). This is indirected – vectored – through the vector WRCHV (Write Character Vector) which resides at &20E.

How does the routine work out its new location? Well, the first command in the OSWRCH routine, which is at &FFEE, is:

JMP (WRCHV)

This tells the operating system to jump to the location pointed to by the WRCHV vector, the normal jump value being &E0A4.

It can be verified by reading the vector at &20E, which is done by typing:

```
PRINT ~ ( ?&20F * 256 + ?&20E)
```

This will give the result E0A4. The Speed Print routine is positioned at PAGE-256, so we have to alter the vector for the program to work.

We do this by typing:

```
?&20E= Address MOD 256: ?&20F= Address
DIV 256
```

(Standard low-byte – high byte notation)

After this has been typed the OSWRCH routine will be directed to Address. The last statement in the machine code program should be:

JMP Return

Return in this case is &E0A4, the old value for WRCHV. The return value for any routine is always the original value of the vector.

If the program does anything with the registers you must save them at the beginning of the program and restore them near the end. Failure to do this will result in a systems crash.

Lines 10 to 60 are used for the demonstration.

Lines 10010 & 10020 ensure that the parameters provided are in range. If they are not, they are changed to the nearest extreme.

Line 10030 temporarily restores WRCHV to its old value and informs the computer where to put the machine code, so that the program automatically relocates according to your value of PAGE.

Line 10040 turns off error messages in assembler and printing of the mnemonics to the screen, so it doesn't mess up your display.

Line 10050 restores all registers by placing them on the stack.

Lines 10060 to 10090 cause a delay corresponding to del, the delay variable provided by the user.

Line 10110 restores all the registers and returns control to OSWRCH.

Line 10130 inserts the new value of the address into WRCHV.

This program is just an example of what can be done by re-directing resident routines. It is almost possible to re-write the entire operating system, but any prolific use of this technique will prey upon valuable RAM.

Remember that the OSWRCH routine handles all the VDU drivers, so don't do anything to affect them.

```
   10 REM Speed Printing.
   20 REM By Graham D. Walkden
   25 REM (c) The Micro User
   30 PROCSPEED(0):CLS:REM always hav
e this at the start of your program.
   35 FORi=250TO0STEP-50
   40 PROCSPEED(i):PRINT"This is text
 printed at speed ";i
   50 NEXT
   60 END
10000 DEFPROCSPEED(del)
10010 IFdel<1 del=1
10020 IFdel>255 del=255
10030 ?&20E=164:?&20F=224:p=PAGE-256:
P%=p+1:FORopt=0TO3STEP3:IFD%=0 o=opt
ELSEo=0
10040 [OPTo
10050 .start PHA:TXA:PHA:TYA:PHA:LDX#
0:LDY#0
10060 .loop1 LDX#0
10070 .loop2 INX:CPX#255:BNEloop2
10080 INY:CPY#del
10090 BNEloop1
10100 .out
10110 PLA:TAY:PLA:TAX:PLA:JMP&E0A4
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10130 NEXT:?&20E=start MOD 256:?&20F=
start DIV 256:0%=1:ENDPROC
```

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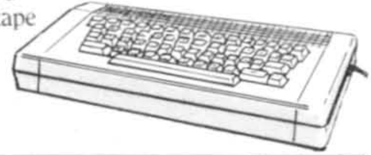

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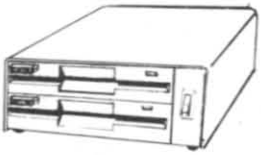

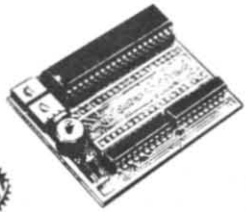

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Searching? Then string alonga

By BARRY HARRIDGE

HERE'S a very handy utility for program development, facilitating as it does a search through a program to find any string. For instance by searching for DEF you can get a list of all the defined functions and procedures. By searching for A= you can find all the spots in the program where A's value changes.

The program has been made to fit onto function key f0, with a little bit of room left for other key definitions of your own. I use an *EXEC file which defines f0 this way, but an easier way is to save all keys using *SAVE FINDKEY B00 C00, then when you want to use it, do *LOAD FINDKEY.

The difficulty in writing any such program is that Basic keywords are stored as coded tokens. For instance the word ENVELOPE is coded as the single byte &E9.

The sneaky way around this is to put the string sought for right into the program and the BBC Basic tokeniser changes it to the required form for the search.

The "funny tricks", the abbreviations and the lack of spaces used in this program in order to fit it on a function key make it rather obscure, but it's worth it to have such a powerful aid to program debugging and development.

Type in or load any program to use as a test case. Carefully type in the key definition given below, as a last line in your program:

```
32000 *KEY0|MMO.7:u=@%:@%=4:i=PA.+4:s
$=$(i+1):REP.:REP.:i=i+i?-1:i=i+(i-4-
PA.)*(i>TOP):U.INS.$i,s$):V.133:P.,25
6*i?-3+i?-2;:j=i:REP.A%=?j:CA.&B53A:j
=j+1:U.A%=13:V.10:U.i=PAGE+4:@%=u|M0|
M|K |M
```

Note that the whole lot must go in as one program line. Then GOTO 32000 will program key f0. Make sure your program does not use line 0 for anything important. It will be lost at the next step.

Type 0/ and flush up against the / put the string you want to find. Then press key f0. For example *0/A=*(press f0). This puts a rather strange line 0 at the start of your program.

Press function key 0. All the lines containing that string will be listed. The bogus line zero is then automatically deleted. At the end of the selective listing will be just 0/string – as a reminder to you of what you were looking for.

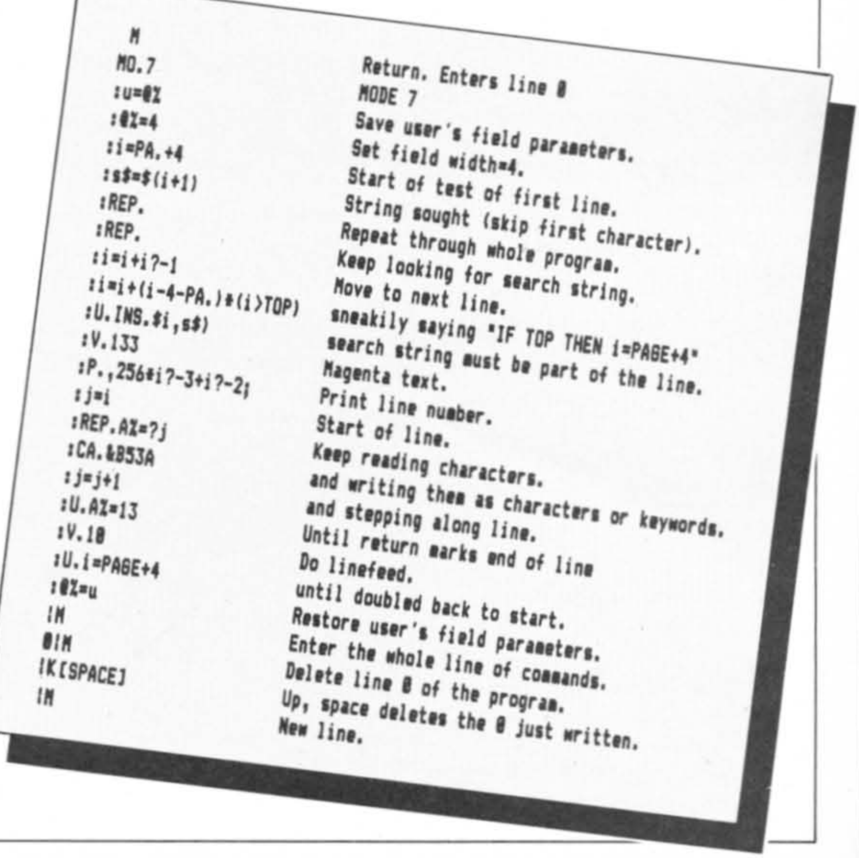
Line numbers mentioned with GOTOs, GOSUBs, etc., are not shown properly, since the Basic ROM codes them in a peculiar way.

The CALL to address &B53A within the Basic ROM uses a routine which prints CHR$(A) if A represents ordinary text (A is less than 128), but expands A as a keyword if A represents a token (A is 128 or more). If you have Basic II you should instead use "CALL &B50E".

You can use anything else instead of /. If you use, for example, 0"END or 0REMEND instead of 0/END you will find that END appears as a word within quotes or REMs rather than as a keyword since it isn't tokenised in line 0.

If you anticipate searching for the same string, say DEF, several times during program development try using 1ELSEstringsought(press f0). Using line 1 instead of line 0 means that the line won't be deleted. For subsequent searches you need only press f0.

Using the keyword ELSE instead of / ensures that it won't affect the running of the program – the ELSE means that all the rest of the line will be ignored.



```
 M
 MO.7                           Return. Enters line 0
 :u=@%                          MODE 7
 :@%=4                          Save user's field parameters.
 :i=PA.+4                       Set field width=4.
 :s$=$(i+1)                     Start of test of first line.
 :REP.                          String sought (skip first character).
 :REP.                          Repeat through whole program.
 :i=i+i?-1                      Keep looking for search string.
 :i=i+(i-4-PA.)*(i>TOP)         Move to next line.
 :U.INS.$i,s$)                  sneakily saying "IF TOP THEN i=PAGE+4"
 :V.133                         search string must be part of the line.
 :P.,256*i?-3+i?-2;             Magenta text.
 :j=i                           Print line number.
 :REP.A%=?j                     Start of line.
 :CA.&B53A                      Keep reading characters.
 :j=j+1                         and writing them as characters or keywords.
 :U.A%=13                       and stepping along line.
 :V.10                          Until return marks end of line
 :U.i=PAGE+4                    Do linefeed.
 :@%=u                          until doubled back to start.
 |M                             Restore user's field parameters.
 0|M                            Enter the whole line of commands.
 |K[SPACE]                      Delete line 0 of the program.
 |M                             Up, space deletes the 0 just written.
                                New line.
```

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It is a FILE which contains RECORDS. Records consist of a number of FIELDS containing the information—an analogy can be drawn with a card index in which a box of cards is the file. Each card is a record and each line on the card is a field.

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SYSTEM FEATURES

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- TRANSFER—Records from one file to another.
- SEARCH LISTS—Allow creation of sub-Databases within main Database.

NEW ✱

- GLOBALENTRY enables repetitive data to be typed in once and placed in as many records as required. Can also be used with a search list to provide a powerful global edit/update facility that will save hours of typing.
- SPOOLER enables you to create spooled files that are compatible with Wordwise, View and other word processors. You can therefore present your data within a document or in varying formats etc.

The spooler program will allow to format your spooled file in the same way as the print out option. You can therefore have headings, columns, titles, numbers etc.

- INPUT is a routine included on the disc which will allow you to write utilities for accessing your data and tailored specifically to your needs.
- TUBE compatible with the 6502 second processor.
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- ORIGINAL USERS send your disc plus £3 for up grade.

REPLICA II: £12.00. DISC

The original REPLICA set a very high standard so the specification we set our chief programmer included some impossible features. In fact ACORN state that some of the things that we have done are impossible, it just took us longer that's all. REPLICA II transfers most cassette based programs to disk, even more than REPLICA. When you buy disk drives you do not have to throw away expensive cassette based programs.

REPLICA II transfers 'LOCKED' programs, programs loading as files, programs that load below &E00, those with up to 6 sections and those up to &6E in length eg adventure programs. No waiting for 6 minutes whilst adventure programs load.

REPLICA II is very easy to use. The user enters a name, how many sections and whether CHAIN, *RUN or *LOAD to load the first section. Press play and let the program do the rest, even a menu.
Think how much it will cost you to buy just 1 disk version of your favourite program—REPLICA II which will hold up to 16 programs, limited only by the disk capacity.

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PRINTER DRIVER FOR EPSON FX80 AND VIEW
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NEW

DISCDEX: £15.00 DISC

- Catalogues all your discs quickly and easily.
- Room to store four thousand titles.
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- Compatible with single or dual drives.
- Extensive print options for catalogue and disc labels.
- Update and delete options.
- Supplied with stick on labels to number your discs and a supply of labels for printing your own disc labels.

DISCDEX is the answer to a disc users nightmare. How many times have you had to wade through your discs looking for the file that you know is there somewhere? Now with DISCDEX those days are gone.

DISCDEX will catalogue all your discs and store them in alphabetic order. In addition to the very useful search and load facility DISCDEX will also print out a full catalogue in alphabetic or disc order. Even more useful is the ability to print disc labels for sticking on the disc or the jacket.

DISCDEX is only suitable for discs with 31 file names as in the standard ACORN system. It is not suitable for double density interfaces.

NEW

ONESHOT: £12.00 DISC

- Full feature trace utility.
- Single step through BASIC program or halt at user determined interval.
- Print line number prior to execution.
- Obey fixed instructions before executing a line.
- Trace window allows screen to be seen whilst tracing execution.
- "Printer only" will force trace output to a printer allowing full screen display.
- Ability to dynamically alter control of ONESHOT.
- ONESHOT can be configured to run in any area of memory.

ONESHOT is a 1.25kb machine code program which gives the user several powerful aids in debugging BASIC programs. These include the ability to SINGLE STEP through the BASIC code of the target program, stopping the processing at specified points and comprehensive trace functions of the variables used by the target program.
A very powerful option allows the user to enter a command string into function key 0 and instruct ONESHOT to obey this command BEFORE each line is executed e.g. *KEY0 PRINT X%; M will print the value of X% before executing each line. This is a very simple example and it is possible to do much more complex things including printing the value of a variable only when it changes or when it reaches a certain value or falls within a certain range. This option can also be used to dynamically alter ONESHOT as it is working. The power of this option is only limited by the users ingenuity.
In addition to ONESHOT the disc also contains 3 very useful function key routines. The first will search for any DEFPROC or DEFFN and print the line numbers in which they appear together with the name of the procedure or function. The second will search for a specific procedure or function and print the line numbers containing it. The third routine will print out every active variable together with its present value.
ONESHOT is not compatible with double density interfaces.

NEW

FUN HOUSE: £10.00 DISC

FUN HOUSE is a highly original suite of educational programs suitable for ages 3 to 13. The program is designed to encourage children to spell words which relate to objects found around the home. Animation and music are used to good effect and some highly original ideas are incorporated.
Each room exercise is terminated with a warning item e.g. the lounge finishes with 'FIRE' which goes on to engulf the whole lounge. Tests with a newly hired 4 year old resulted in us having to prise him away from the keyboard after 2 hours. In that time he had gone from never having used a keyboard to finding the location of all the keys very quickly and entering the correct answer. He had thus started on the path to learning spelling and familiarised himself with the keyboard including the use of DELETE to correct his mistakes. Can you afford not to give your children the same start?

FUN HOUSE is not compatible with double density interfaces.

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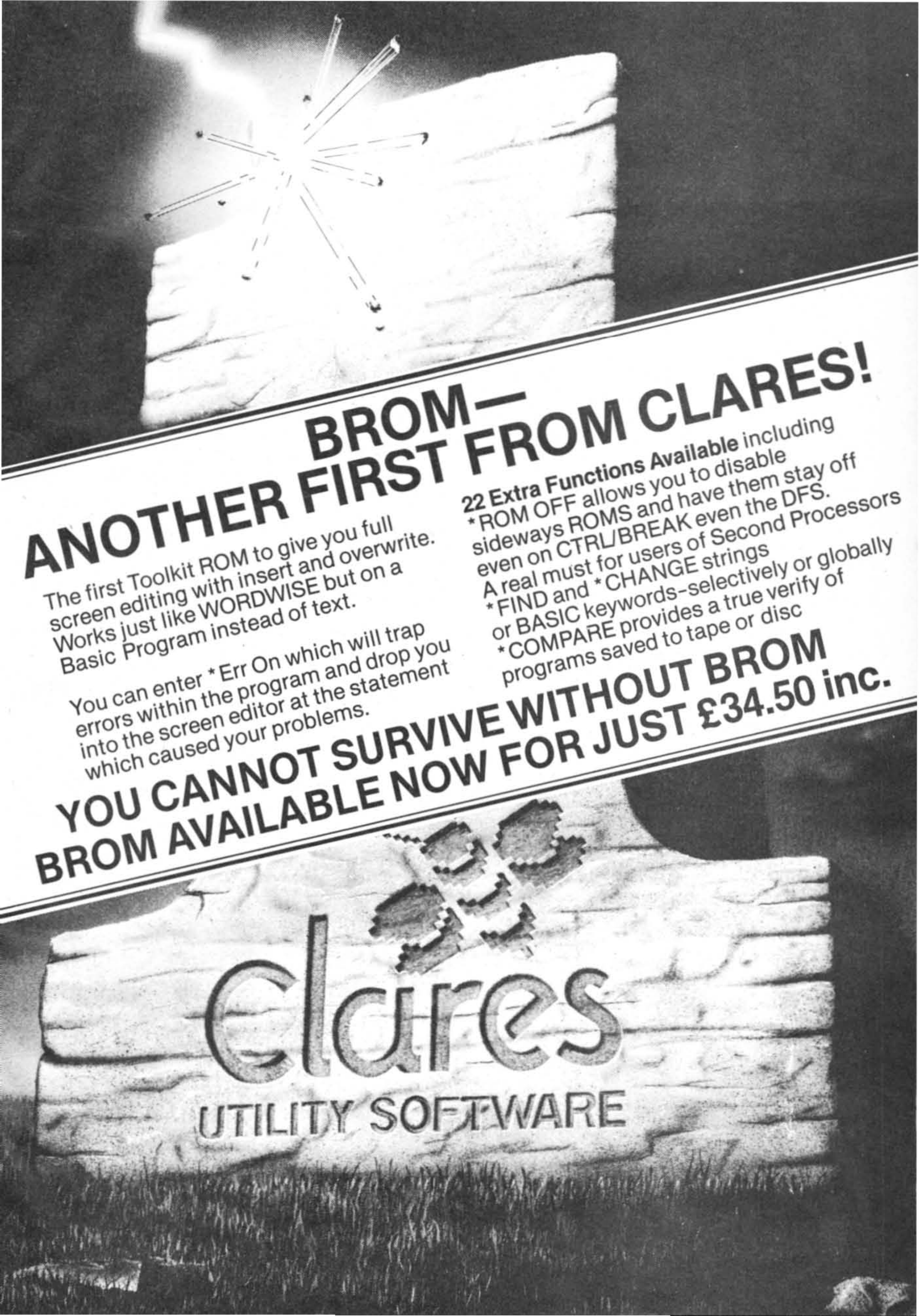

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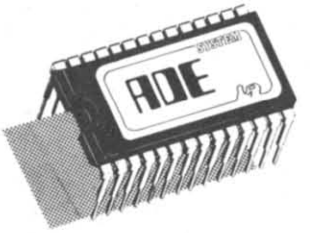
SYSTEM SOFTWARE

·ROMs FOR THE BBC MICROCOMPUTER·



Now second processor compatible - over twice as fast across the Tube© and enhancements.

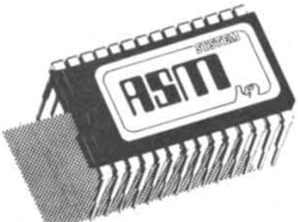
The complete program development package for assembly language programmers. ADE is the de facto industry standard for professional software writers using the BBC microcomputer. The 16k ROM contains a full 6502 MACRO assembler, a dynamic text editor, a front panel debugging monitor and disassembler. ADE comes complete with a 160 page comprehensive reference manual and a utility/macro library disc. ADE can also be used with tape based machines.

The ASSEMBLER features macros with library facilities; nestable conditional assembly; flexible listing options (with or without macro expansion); hex, decimal, binary and ASCII data formats; dummy section; full range of arithmetic and logical operators; symbol table sort and dump; file chaining and 29 powerful pseudo ops. Source and object files are kept on disc so there is no limit on program size or location.

The EDITOR is designed with the programmer in mind for writing both programs and documentation. The editor includes a very powerful command language (including macros) that enables much editing to be done on a semi-automatic basis. It features full screen editing and deferred edit modes; no limit to document size; edit with backup facilities and a versatile text formatter.

The DEBUGGER is instantly accessible for inspecting, modifying and disassembling machine code programs. Features include full 64 byte display in hex, ASCII and disassembled format; registers; stack; single step; breakpoints; memory search and much more.

Price £60 inc vat. Please specify 40 or 80T utility disc.



ASM provides all the superb features of the ADE macro assembler on its own ROM.

The program source file may be written using any editor (even Wordwise or View!). Complete with reference manual and utility/macro library disc. Use the assembler that professional software writers use.

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SYSTEM
SPY2

Now second processor compatible.

SPY2 is a combined front panel debugging monitor and disassembler with extensive disc utilities all on one ROM. SPY2 is instantly accessible to the programmer for inspecting, modifying, debugging and disassembling machine code programs. SPY2 also features a relocator and program trace facilities. SPY2 will access any ROM either in the sideways ROM sockets or on an extension board. ROM memory may be displayed, single-stepped through or disassembled.

SPY2 includes a set of powerful disc recovery commands for interrogating, editing and retrieving data stored on a floppy disc. SPY2 also includes a disc formatter as well as a non-destructive single track reformatter.

In all SPY2 has a comprehensive set of 23 utility commands. These are supported by an excellent Reference Manual.

The SPY2 front panel encompasses all the superb, easy-to-use facilities of the renowned SPY debugging monitor PLUS additional commands for toggling and finding breakpoints; relocating machine code programs; single stepping through subroutines in one go and facilities for accessing the front panel from programs in RAM or ROM with breakpoints, OSBYTE or CTR-F.

SPY2 features a versatile disassembler with hex dump, full and intelligent disassembly. This identifies data areas in the program; these being displayed as a hex/ASCII dump. Operating system calls are labelled creating very readable code. The powerful trace facilities enable program instructions and register contents to be traced to printer whilst the program is running. Indispensable for graphics programs as they can be stepped through whilst observing the effects on the screen.

SPY2 features a disc sector editor displaying the contents of a whole sector; disc search facilities for finding byte patterns or strings and free disc space. Files may be recovered by creating a directory entry with all the data concerning the deleted file. Directory entries can be easily amended using the *AMEND command. The *FORMAT command formats discs with any number of tracks. A verify command checks discs. The *REFORMAT command is extremely useful for recovering information from a bad track, reformatting it and restoring the data. Commands are included for loading files at &1900 and automatically downloading (and running) them.

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Slick way round the 'ROM without a home' problem

ROM cartridge system
Viglen

HERE'S another alternative to having a ROM board fitted to your BBC Micro when you want to use more ROM based programs than you have room for.

You are no doubt aware that the BBC can have up to 16 paged ROMs, each holding either language or utility programs ready to be called by the operating system. Unfortunately the BBC's main board can only house four of these ROMs at any one time.

If you have more than four – and you must remember that one of these is Basic, another the DFS and a third is NFS if you use Econet – you now have two ways to use all your chips.

The first is to buy a ROM board which can accommodate up to 16, but the difficulty is that each chip on board draws power from the BBC's supply.

This is seldom critical with populations of less than six chips but if you rise above this point, then the machine has been known to crash programs due to power instability.

Using the Viglen sideways ROM cartridge system allows you to prevent this by giving the option of changing the ROM connected at any time without having to open up the micro at all.

The system is based on a plug-in printed circuit board which fits into an edge connector mounted in the BBC's "ashtray" – or more correctly its serial ROM slot.

The only time this is used is when you have the speech expansion fitted and then only to connect the so far mythical, extra phroms (Phrase Read Only Memories). This makes it an ideal location for a system such as this.

The edge connector is housed in a black plastic moulding and fits neatly onto the top of the micro's case. A ribbon connector then runs underneath the keyboard and terminates in a 28 pin DIP header plug which is plugged firmly into a spare socket.

The result of this fitting is that you have a ROM socket on the front of the keyboard and using the special cartridges, one of which is supplied with the unit, you can remove and insert ROMs at will.

So much for the theory. What's it like in practice?

Fitting the unit itself is simple, fast and needs no tools. Inserting the cartridges is also very easy but you must have the machine turned off at the time to protect the ROMs you are using.

This is the source of one possible drawback. If you have utility ROMs in your cartridges and have a program that you want to edit in memory you *must* save it before inserting the ROM.

This is unlikely to stop anyone using the system but should be borne in mind. For this reason I will probably only use the cartridges for language ROMs, as one is unlikely to want to change language and still retain the current contents of memory.

A further drawback is the size of the cartridge unit when inserted. If you are using your BBC as a word processor it does restrict access to those keys at the left of the keyboard, especially the Esc, Caps Lock and Shift Lock keys.

Having said that neither of the problems mentioned are likely to cause insurmountable difficulties to anyone who needs this type of system. I was particularly impressed with the thoughtful design of the whole system. The socket is neat and has rounded edges and is fitted with a cover when not in use.

It is impossible to insert the cartridges the wrong way and blow the chips, due to the keyway that forces correct insertion.

Finally if you ever want to remove the whole system, Viglen supply a new cover for the hole left behind. There is even a special clip-together container for the cartridges when they are not in use.

It is a far cry from a number of other BBC add ons that look as if they were designed on the back of a cigarette packet one evening.

Overall, this is a superb system with very few drawbacks except the cost of the cartridges themselves. The basic unit is £19.95 and cartridges are £6.95 each, with quantity reductions.

Dave Carlos

A touch of the trapeziums...

DigiGraph
Tarren Products

IN the June 1983 issue of *The Micro User* I described how to build a radius arm graphics digitiser. Since then several have appeared on the market although, as far as I know, none have incorporated my technique of improving their accuracy.

One such commercially available tablet is the Tarren DigiGraph. This is solidly built on an 18in × 15in plastic-coated board, rather like the boards sold in kitchen shops for chopping up vegetables. The top is covered with a one centimetre grid and has three small holes drilled in it.

The radius arms are made from tubular aluminium and the potentiometers are enclosed in plastic tubes. At the end of the final arm is a perspex disc with target-like concentric rings, the height of which can be adjusted with a knurled knob to

→

The
DigiGraph

From Page 107

accommodate different thicknesses of books.

A generous 4½ft of cable plugs into the analogue input port of the micro. The construction looks like it can stand up to some abuse.

In use software converts the angles on each arm into a pair of X, Y coordinates that can be used for inputting data. Before this can happen the DigiGraph has to be calibrated by placing the target point over each of the three small holes as directed by the calibration program.

The accompanying software performs a comprehensive set of drawing, plotting and filling routines. The operation required is selected by pressing a single key.

There are so many different modes of operation that you will need the command summary sheet with you until you have acquired a great deal of experience operating the unit.

There are a series of exercises which gradually introduce you to the functions and possibilities of the unit. These were quite easy to follow and I had no difficulty coping with them.

They were contained in the 32 page "Introductory Instructions" booklet, and used a series of separate work sheets to trace around.

I did have difficulty following the "Examples for a first time user" in the main (18 page) booklet. Not that they were difficult but they told me to stick the map onto the board and follow the instructions. Unfortunately the instructions were on the other side of the sheet to the map.

The software allows you to specify the area of the tablet which is mapped to the screen, thus allowing you to enlarge or reduce drawings to some extent.

The DigiGraph uses Mode 1 or Mode 2 graphics and the results shown in the book look impressive.

A digitiser of this type is most use when inputting freehand data such as maps and contour lines as well as drawings.

This is due to the trapezoidal distortion which is produced due to non-linearities in the potentiometers. This means that if you trace around a square you will actually get a trapezium.

In the worst case – where the maximum size area is being used – the DigiGraph has a distortion factor of 0.9, which means that the top of a square comes out as 16.5cm and the bottom as 18cm.

This is obviously unacceptable when producing engineering type drawings, so to get round this there are modes that will just draw horizontal or vertical lines. In this case you just use the DigiGraph to manoeuvre a point on the screen as it will no longer trace the arm movement.

Of its type the DigiGraph is well constructed and its comprehensive software includes most of what you need to produce impressive drawings.

Mike Cook

Phloopy, half way house twixt disc and tape

Phloopy
Phi Mag Systems

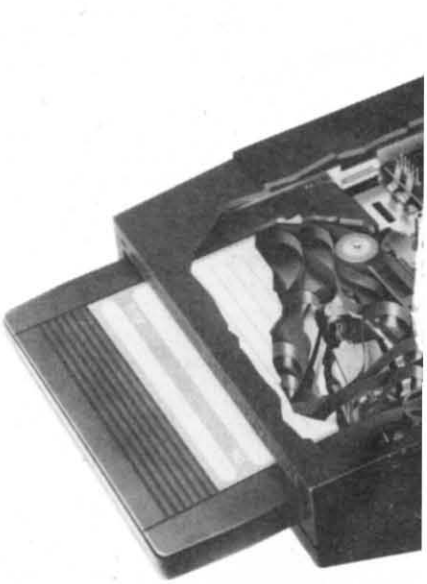
THE name Phloopy sounds as if it might have been derived from "fast loop". And it is, in fact, based on a continuous loop of tape in a cartridge.

With eight data tracks this effectively gives a longer tape with a shorter time to complete each cycle of the tape. Each cartridge can hold about 100k of information, about the same as one side of a 40 track floppy disc.

The drive is housed in a black 6in × 8¼in × 2½in box. On its front surface is a cartridge slot, a green light to indicate power on and a red light to indicate unit active.

Connections to the BBC Micro are by a cable to the auxiliary power socket and ribbon cable to the disc drive socket.

The interface consists of a printed



circuit board (1¼in × 2¾in), which plugs into the socket normally occupied by the floppy disc controller if a DFS was fitted. Two sets of links are plugged into two other sockets on the board.

To complete fitting, the leads of two resistors are cut – not a happy experience just for a review.

Software for the filing system, as you'd expect, is on an eprom which occupies one of the paged ROM sockets. Phloopy reserves 2k of memory for its own use so that PAGE is set to &1600.

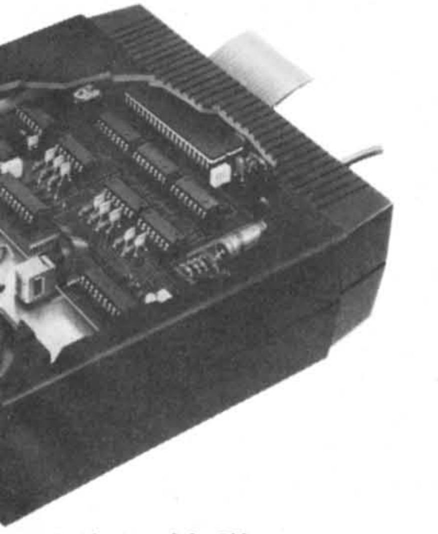
When a cartridge is inserted into the slot the drive motor comes on for about 12 to 15 seconds. During this time the drive will not accept any commands. Though if, for instance, *CAT is typed when the motor has stopped, it responds quickly with a catalogue.

One useful piece of information displayed here which is sadly lacking on the Acorn DFS is the number of bytes still free on the media.

Each time a single command is entered the response is quick, but the unit takes some time to settle down before being ready for the next command. So when entering a series of commands there is an annoying wait.

Although the commands have been made to appear much as they would in the DFS there are not so many of them. Nor are they so flexible.

For example, if you want number of files with *INFO, with the DFS you'd enter *INFO * while with Phloopy the command would have to entered with an individual file name rather than a wildcard name. Also OSGBPB is not implemented. There is an auto boot facility when the Shift and Break keys are pressed, but it will only *RUN a program. Surely there should also have been options to CHAIN or *EXEC programs as well.

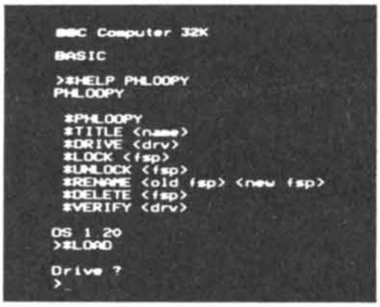


Inside view of the Phloopy

Most of the command names explain what they do. For example *TRANSFER eases problems with transferring files between tape and Phloopy. *LOCK and *UNLOCK refer to locking a file to prevent accidental overwriting or deletion – more logical than the DFS's *ACCESS command.

Loading and saving are quick and easy. It only takes about five seconds for a 16k program to load which is not much slower than disc.

However it would be a mistake to compare the Phloopy and the DFS too closely when it comes to reading and writing data files. It's still faster than the tape system but is only about a tenth the speed of the Acorn 0.90 DFS.



```
BBC Computer 32K

BASIC

>*HELP PHLOOPY
PHLOOPY

  *PHLOOPY
  *TITLE <name>
  *DRIVE <drv>
  *LOCK <fsp>
  *UNLOCK <fsp>
  *RENAME <old fsp> <new fsp>
  *DELETE <fsp>
  *VERIFY <drv>

OS 1.20
>*LOAD

Drive ?
>_
```

That said, the Phloopy is able to run relative (random) access files. The manual was rather vague on how to use them – a pity as the BBC User Guide to which you are referred is not too informative on this area either.

PTR# would not point beyond the current end of file end, to extend it, as is possible with the DFS. The best way to create a relative file was to *SAVE a section of memory of the required length first as a dummy file, before opening the file to enter data.

Documentation is supplied in the form of a 60 page manual. Installation of the interface is clearly covered, along with commands that operate the filing system.

As I've mentioned before, when buying any non-standard filing system you have to be sure that the software you want is either available on this new media or can easily be transferred. The last option is often not easy due to the growing sophistication of software protection.

The Phloopy is very much an in between system. Although it's much faster and more organised than the tape filing system, it is still not as fast and flexible as disc, especially with data filing.

Since the whole system only costs a little more than a disc interface it should prove attractive to those who are fed up with the cassette filing system and can't afford to move to discs.

Jim Notman

A lot to say, but what a way to say it...

D.E. Talker
D.E. Systems

IF you wish to add a voice to your BBC Micro, D.E. Talker is yet another alternative to the official Acorn speech processor upgrade.

D.E. Talker consists of a small (63 × 85mm) carrier board containing a speech chip, vocabulary ROM, and 10 other ancillary components.

The carrier board plugs into a sideways ROM socket – it will only fit into the third or fourth from the right – and a flylead is attached by a spring clip to a resistor (R11) towards the front left of the micro's printed circuit board.

Installation was simple and the device worked perfectly first time.

Incidentally, the system could also be fitted to a sideways ROM expansion board but not to a ZIF socket as the lever gets in the way. Instructions for fitting and use were quite good and plenty of examples were given.

On switching on the micro with the device fitted, "BBC computer" is announced. Over 350 words and word parts are stored on ROM and may be combined to build a relatively unlimited speech vocabulary.

The single speech command *S"any words" may be used directly or in Basic

→

From Page 109

programs. Some examples are shown in Figure I.

Much of the control and understanding of speech requires various periods of delay between words and part words. Delays from 10 msec to 200 msec may be programmed directly using spaces, commas, semi colons and so on.

Longer periods may be determined using combinations of pause commands. For example:

***S“FIVE+P100+SIX”**

produces a one second delay between the words *five* and *six*.

In comparison to the Acorn speech chip the data available on D.E. Talker is extensive and versatile. Available are word endings (-ing, -ous, -tion and so on), word beginnings (pr, br, st, sh, and so on), double vowels, hard vowels, soft vowels and stressed or alphabetic letter sounds.

Ease of programming is further enhanced as string variables can be included within the speech command. For example:

***S“H E L+L o/(name$)/H+OW +ARE+YOU”.**

Having sung D.E. Talker's praises with respect to its versatility I must now turn to its sound. In comparison to the Acorn speech processor, speech from D.E. Talker is awful. The sound is very synthetic and machine-like and was often difficult to understand without repeated hearings – it makes K9 and the Daleks sound positively eloquent!

At around £40 I would certainly expect better vocal quality before parting with my money.

However, there are some better things to come. All the previous comments refer to the standard system with a version 1.00 ROM. Available as an optional extra – about £12 – is a version 2.00 upgrade ROM.

This has various talking typewriter commands which announce the characters of the keys as they are pressed.

The various extra commands – six in all – allow selection between alphabetic sounds or letter sounds with either the upper or lower case keys selected. A *SOFF command is also included to switch off this speech ROM.

Version 2.00 would seem to have good potential applications for visually handicapped people as well as an aid to those learning touch typing.

A very useful feature on the upgrade is the verbalisation of control functions. For example, pressing Ctrl B says “Print On”, or SHIFT FUNCTIONn would announce the control colour.

Overall, a very well thought out and versatile utility – it is just a pity about the poor speech quality. However the only convincing test of any device of this kind is to hear it for yourself and then decide whether the sound is acceptable to your ears.

Mike Mahon

Command	**Speech**
***S“H+EL+OH,IY,AM,AY COM+P+UE+T+ER”**	Hello, I am a computer.
***S“ONE TWO THREE”**	One, two, three.
***S“THE,M+i+CR+o,UZE+ERR”**	The Micro User.
***S“FIF+TY FIVE THOUSAND AND ONE”**	55,001.
***S“S+OO+P+ER+C+AL+ER+FR+ADGE+EL+IS+T+IC+EX+P+EE+AL+EE+D+OH+SH+US”**	

Figure I

Help that poor old DFS memory along

E00 DFS
MRM Software

ONE of the annoying features of the standard Acorn DFS is that it reserves $2\frac{3}{4}$k of precious RAM for its own use. This is noticeable especially to those who have moved up to disc use after tape.

Although it doesn't sound much this loss of memory poses three main problems:

☐ It reduces the available memory in Mode 0, 1 and 2 by about a third.

☐ There may not be enough room for very long programs to run – adventure games are a problem here.

☐ Machine code programs may have to be located at a specific location which now belongs to the DFS.

It is possible to load then move the programs down in memory, but this is not practical if the DFS still needs to be active.

One solution to the problem is to buy a 6502 second processor, but that costs about £200 and there's a lot of software which won't run on it.

The easiest and cheapest solution is to get the E00 DFS. Like most good ideas it is simple.

It comes as a small piece of printed circuit board (about 2in × 2in) with the software on eprom, some RAM and two other components. This plugs into a paged ROM socket replacing any other DFS. There is no soldering.

To complete fitting, a miniature probe is clipped onto one of the legs of IC 77. *I can see these little probes coming into more widespread use with add ons to the BBC.*

Although the *HELP command announces the DFS as the MRM DFS 1.20, it can be considered to be the same as the Acorn 0.90 DFS with exactly the same commands and actions. Benchmarks showed there was no real difference in timings.

The clever thing about the RAM on the board is that it is only switched in when needed by the DFS. Due to limited RAM only four files can be open at any one time and the *BUILD command needs to have its line lengths restricted to 100 characters.

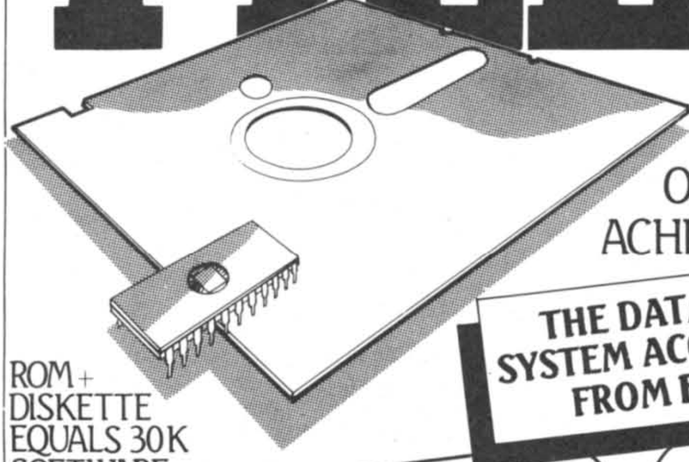
The only other problem you may encounter is with the programs that want to look directly at disc memory, rather than use proper operating system calls, as the disc memory is now private to the DFS.

Three sheets of documentation complete the package. Apart from the easy to follow fitting instructions, there is advice on using the E00 with other DFSs and on fitting the E00 when extension ROM boards are fitted.

It can be recommended as a practical solution to the memory problems of the DFS.

Jim Notman

FILEAID



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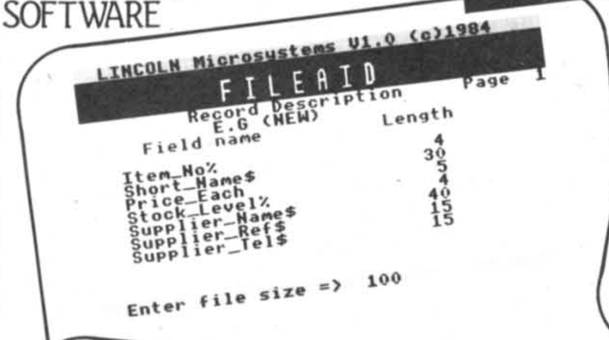
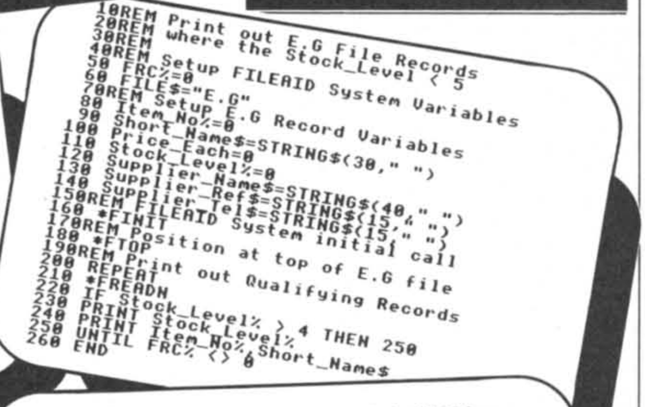
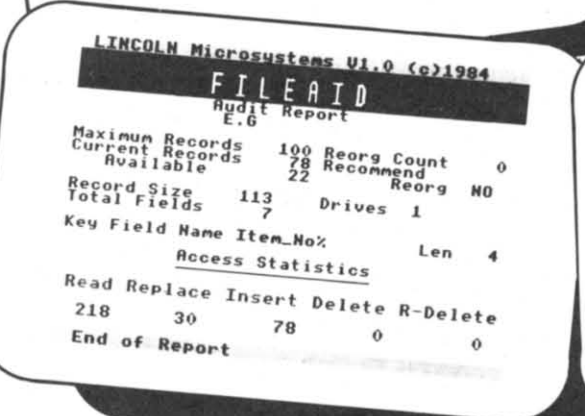


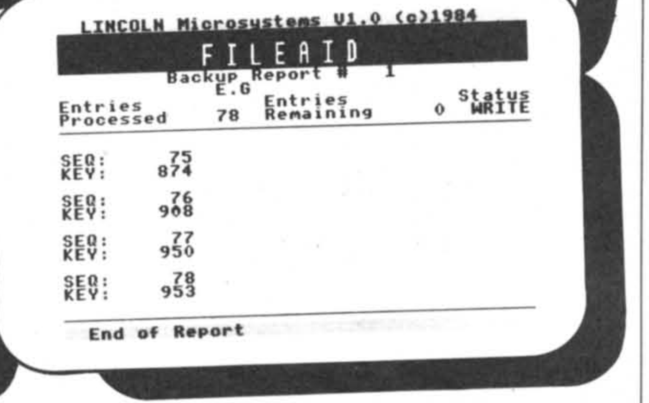
```
LINCOLN Microsystems V1.0 (c)1984
            FILEAID
      Record Description        Page  1
          E.G (NEW)
   Field name              Length

 Item_No%                     4
 Short_Name$                 30
 Price_Each                   5
 Stock_Level%                 4
 Supplier_Name$              40
 Supplier_Ref$               15
 Supplier_Tel$               15

 Enter file size =>  100
```



```
10REM
20REM Print out E.G File Records
30REM where the Stock_Level < 5
40REM Setup FILEAID System Variables
50 FRC%=0
60 FILE$="E.G"
70REM Setup E.G Record Variables
80 Item_No%=0
90 Short_Name$=STRING$(30," ")
100 Price_Each=0
110 Stock_Level%=0
120 Supplier_Name$=STRING$(40," ")
130 Supplier_Ref$=STRING$(15," ")
140 Supplier_Tel$=STRING$(15," ")
150REM FILEAID System initial call
160 *FINIT
170REM Position at top of E.G file
180 *FTOP
190REM Print out Qualifying Records
200 REPEAT
210 *FREADN
220 IF Stock_Level% > 4 THEN 250
230 PRINT Stock_Level%
240 PRINT Item_No%,Short_Name$
250 UNTIL FRC% <> 0
260 END
```



```
LINCOLN Microsystems V1.0 (c)1984
            FILEAID
         Audit Report
             E.G
Maximum Records     100 Reorg Count      0
Current Records      78 Recommend
  Available          22          Reorg  NO
Record Size     113
Total Fields      7       Drives  1
Key Field Name Item_No%
                            Len    4
     Access Statistics
Read Replace Insert Delete R-Delete
218     30     78      0       0
End of Report
```



```
LINCOLN Microsystems V1.0 (c)1984
            FILEAID
        Backup Report #   1
             E.G
Entries              Entries              Status
Processed      78    Remaining         0  WRITE

SEQ:      75
KEY:     874

SEQ:      76
KEY:     908

SEQ:      77
KEY:     950

SEQ:      78
KEY:     953

End of Report
```

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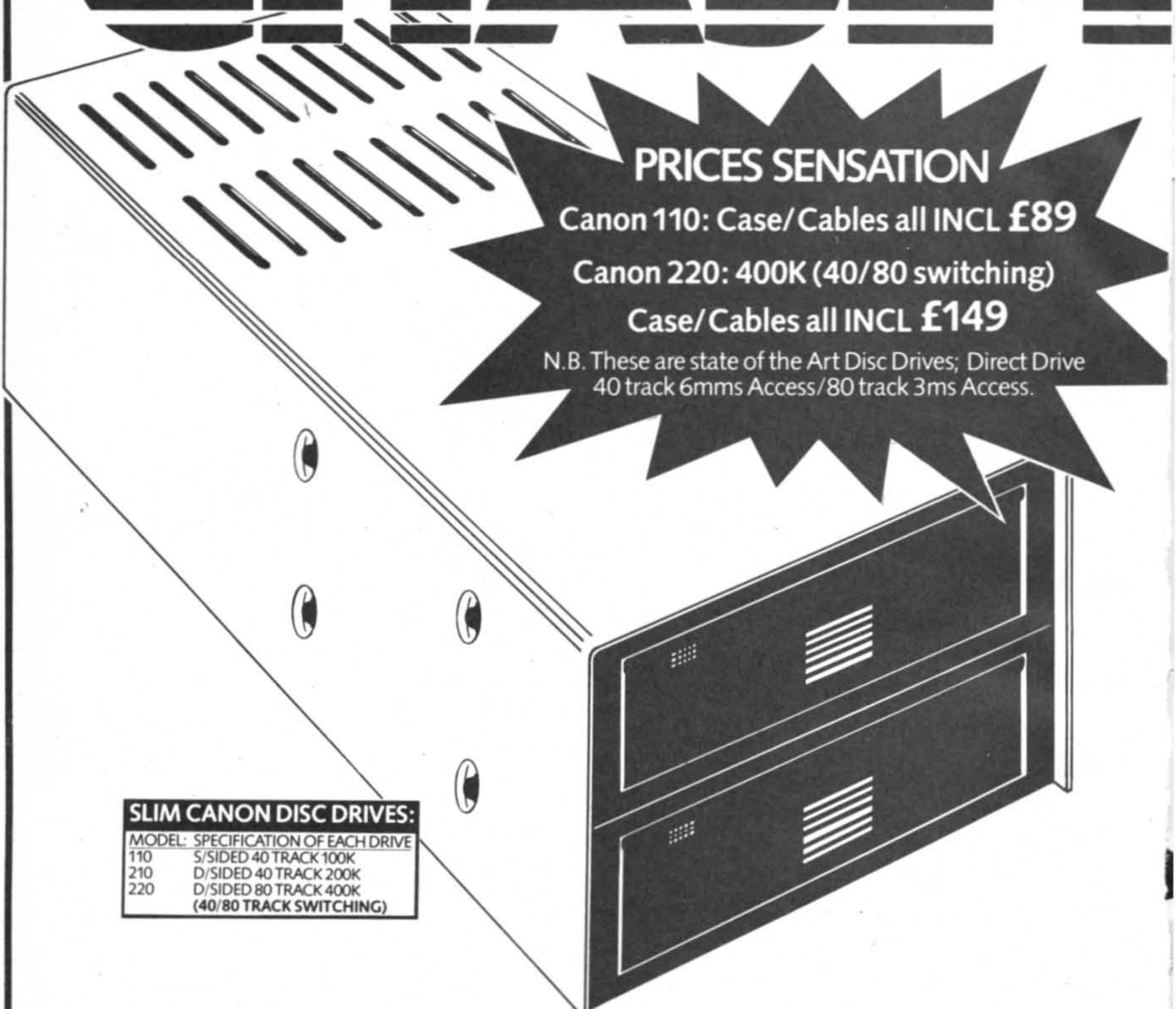

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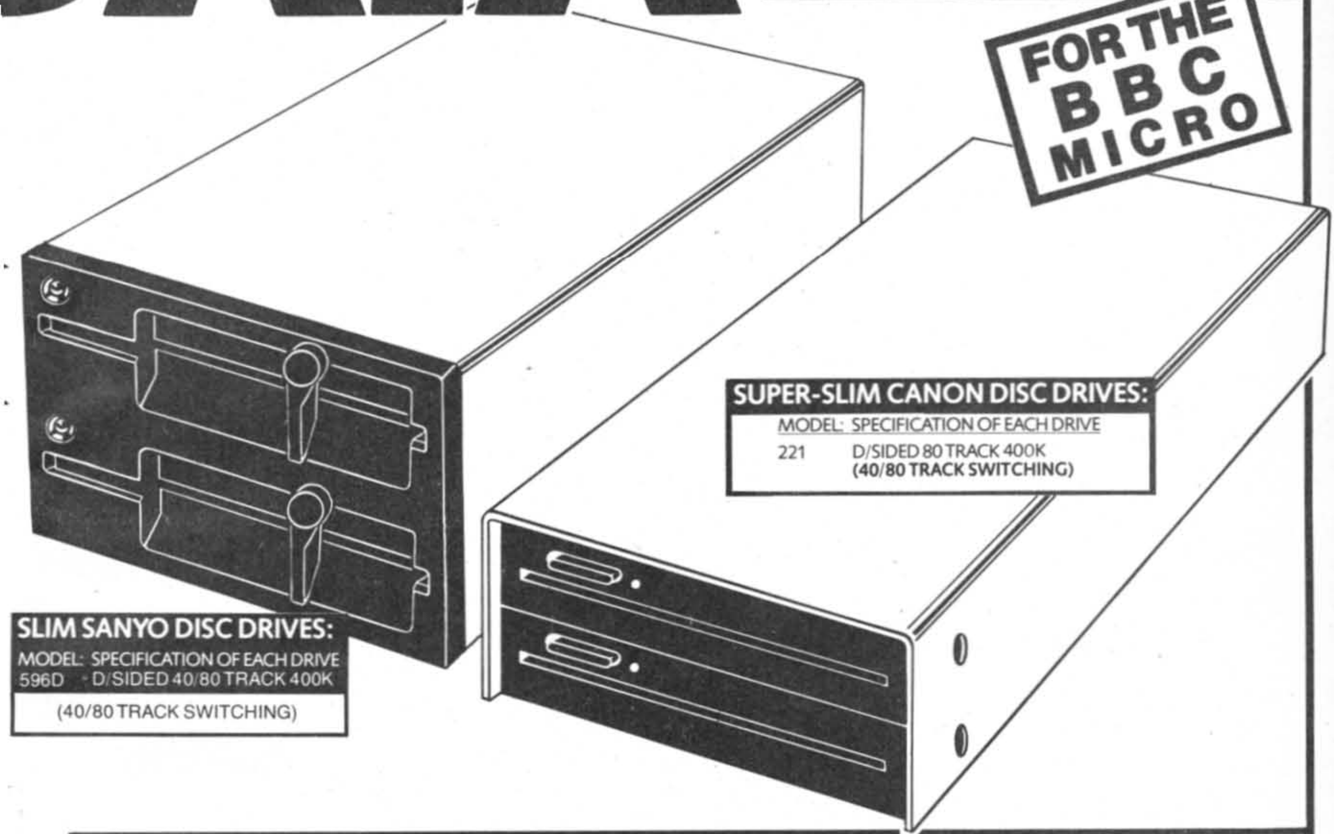

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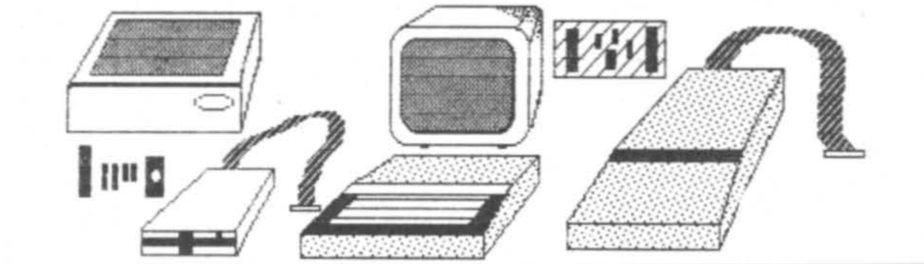

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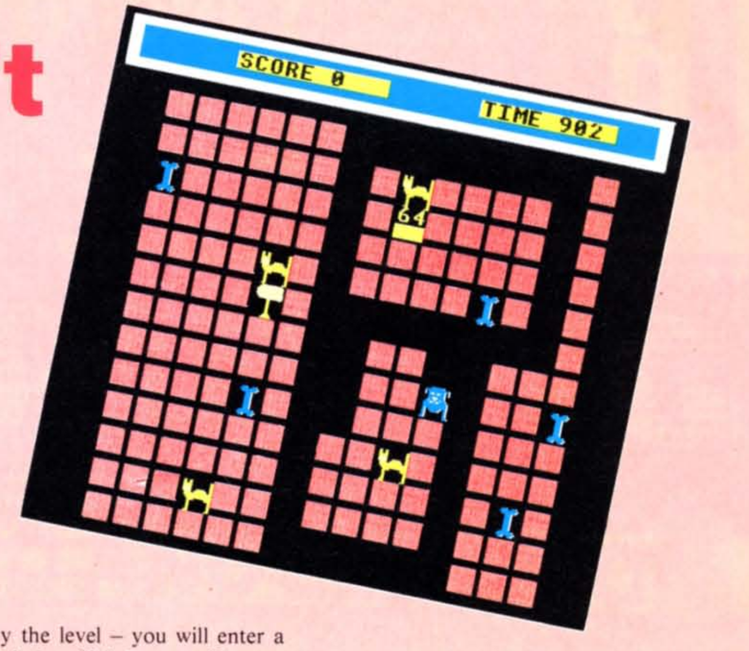
Access

There ain't no flies on Rover!

. . . and it's your job to keep them away from his food, too, in this woof and tumble game from GRAHAM WALKDEN



IF you're the type of person who can think on your feet, Rover is the game for you. Its flat-out action calls for split second decisions – but they'd better be the right ones or you'll be in trouble later!

The object of the game is to move your dog around the screen to reach his food before the flies devour it all.

In order to eat the food, Rover must land on it. When he does, he will be given another bowlful at a different position on the screen, and your score will be increased by the time remaining.

In his journey to the food he will encounter bones and cats. If you position him over a bone, you will be given extra points. But if you make him hit a cat it will attack him and you will lose valuable time.

In later levels there will be a white, rampant cat who will attack and kill you. This feline menace must be avoided.

From time to time Rover will be obliged to answer the call of nature. The status of this particular function may be ascertained by reading the TIME indicator in the top right-hand corner of the screen.

When Rover clears so many bowls – defined by the level – you will enter a bonus mode in which Rover will move across and then down the screen. Below him will be a line of trees and one food bowl.

If you stop Rover when he is above a food bowl, he will fall on it and you will be rewarded with a bonus, the size of which decreases as Rover gets lower. If you miss the food bowl, however, Rover will hit a tree and no bonus will be given.

When the bonus stage has been completed you will be given a fresh screen, but the number of obstacles will increase and the time to reach the food will decrease. The number of food bowls per screen will also increase.

If you survive long enough to reach the third screen, you will be confronted with a cat which will move in a random manner, leaving spaces where blocks were, but leaving other objects such as bones, cats and food bowls intact.

The cat moves pretty slowly, but will increase in speed later on.

When you land on one of the red blocks you will over-print it, leaving a space behind you. You cannot return to this space so you have to work out your route carefully before moving.

During any stage of the game the food bowl may land in an inaccessible position, such as surrounded by spaces. You can get around this by using the scroll facility.

This allows the column Rover is standing on to scroll either up or down, depending on which key is pressed. The scrolling will wrap around, which means that an object disappearing off the top or bottom will re-appear at the bottom or top respectively.

The scrolling can be used to advantage in other situations, such as to move up the screen without leaving the non accessible squares behind you.

The program automatically sets you to lower case.

z	Move Rover to the left.
x	Move Rover to the right.
k	Move Rover up.
m	Move Rover down.
K	(Shift + k) Scroll up.
M	(Shift + m) Scroll down.
q	Sound off.
w	Sound on.

The keys have been chosen so that they are easily accessed and are in a comfortable position.

The reason that the keyboard must be in lower case mode is because the scroll is activated by pressing Shift and the appropriate key, thus producing upper case so a different character.

Due to memory restrictions on the BBC Micro, this program will only work when PAGE is set to &E00. This will not cause any difficulties for cassette users, but those with discs will have problems.

The following is for them only – cassette users ignore it.

Type in the program as normal, check it then save it to disc. (Do not run it.) Once done, switch off your machine, plug in your tape recorder then switch back on and load the program. Run it, and the program will automatically re-locate itself to PAGE &E00.

*Debug the program and when it is working correctly save it to tape. *CAT to check that it has been saved, then hit*

*Break, type *TAPE and load the program. Type *DISC, save the program to disc and run it. The program should load, relocate and work perfectly.*

Those with cassettes should type in the listing as normal. You don't need a downloader routine so you can miss out lines 40, 50, 60.

Disc users must not press Break while de-bugging the program. If you do, you may encounter the dreaded "Bad program" error, or at best half your program will be deleted, and the remainder filled with garbage that you didn't put there, such as OSCLI statements in peculiar positions.

I have set up the ONERROR function to stop, beep and restore the text cursor and white lettering so any errors will halt the program. Make sure that you test the ONERROR facility by inserting a deliberate mistake at line 15 when you have finished typing in the ONERROR line.

This will check to see if the line contains any errors itself. If there are and you run the program, the ONERROR line will form an endless loop which can only be terminated by pressing Break.

This happened to me while developing the program and it ruined all my work, so beware.

With the program now saved, verify it by using *CAT to check that the signal is recognised by the micro. All being well, you can now play.

If you get the dreaded "No room at line x" error message, it means that the program is too long. This is probably because you have typed in too many

→

Hints 'n' Tips

☐ *Instead of using the up and down keys, use the scroll ones. This will reduce the number of blank squares printed after you move.*

☐ *Only go for the bones if they are between you and the food. This again will reduce the number of blank squares printed.*

☐ *Don't hold the keys down, but for each movement press it again. This makes controlling the dog much easier.*

☐ *In the bonus stage, aim for the space before the food bowl. Unless your reactions are instantaneous, you should hit the bowl.*

PROCEDURES

init	Prints out the title page and displays scores.
vars	Initialises all variables.
scrn	Sets up the screen.
food	Works out the food coordinates and prints them.
tree	Same as food but with the tree.
scrollup	Scrolls the screen up.
scrolldown	Scrolls it down.
cat	Prints the roving cat.
bonus	Bonus game where dog is directed onto food bowl.
fight	Fight procedure where yellow cats attack the dog.
update	Updates the food counter and prints it.
print	Prints out the characters pointed to by *v*. This is used in the scrolling and cat routines.
telex	Prints text in the middle of the screen to make output neater.

VARIABLES

sc%	Score.
hs%	High score.
a$	Last key pressed.
x%	x coordinate of dog.
y%	y coordinate.
sq(16,14)	Memory map variable.
a%	x component of dog movement vector.
u%	y component.
dog$	Dog.
tree$	Tree.
food$	Food.
cat$	Cat.
block$	Block.
mem%	Current code value.
sheet%	Level counter.
df	How many passes of main program required before cat routine is called. (cat mobility).
ct%	Counter. Used in conjunction with the above variable.
fly%	Amount of food left.
fd%	Number of bowls consumed on that screen.
fc%	Maximum time allowed for food collection.
scr%	Total number of food bowls collected.
tlt%	Time before tree routine required.
fin%	Number of obstacles on the screen.
fx%	x coordinate of food.
fy%	y coordinate.
tx%	x coordinate of tree.
ty%	y coordinate.
sk%	Update skip variable.
t%(13)	Temporary storage for screen codes.
px	x coordinate for printing.
py	y coordinate.
y	Either 1023 or 1024; used to ensure that the squares are printed in the correct position.
cx%	x coordinate of rampant cat.
cy%	y coordinate.
d$	String for telex procedure.
ac	x coordinate of bowl in bonus mode.
x	x coordinate for dog/telex printing. (LOCALed)
y	y coordinate.
i%, j%, h%, i, j & g	Used in FOR-NEXT loops.

From Page 117

spaces at the end of lines after Return has been pressed.

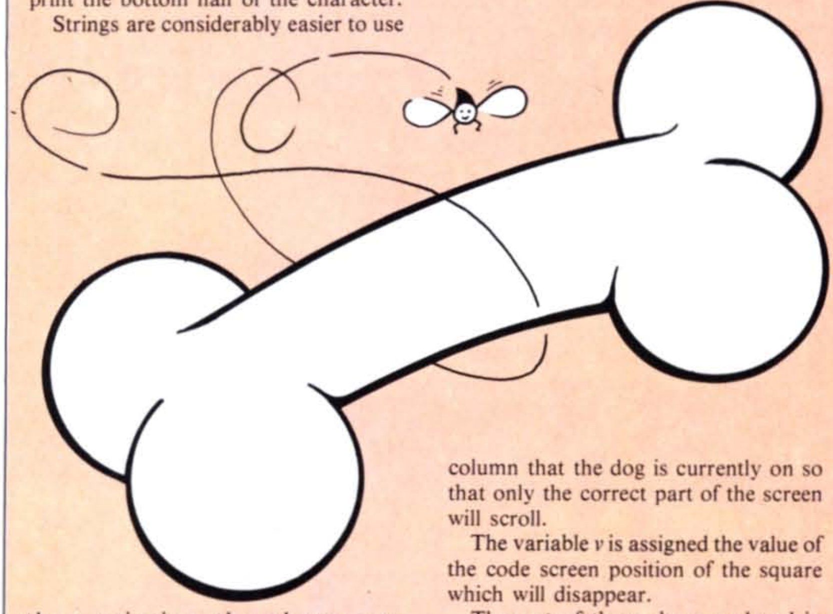
To correct this, change the character for a space to something else such as VDU23,32,255,255,0,0,255,255,0,0 – then change to Mode 6 and list the program.

Rover contains many procedures and techniques you may find useful in your own programs.

All the multi-character shapes printed on screen, such as the dog or the cat, are contained within strings, such as *dog$, cat$, food$* and so on.

The strings comprise of the actual graphics characters and the VDU control codes to move the cursor down and left (CHR$10 & CHR$8) so as to print the bottom half of the character.

Strings are considerably easier to use than printing the characters individually, and save program space.



The multi-coloured characters such as the dog food are printed by combining the text and graphics cursors (CHR$5) and using the GCOL0 colour command.

The first shape is drawn, then the second is superimposed on top of it. In the case of the food bowl, both a positive and a negative have been defined, and the negative is printed on top of the white positive in red.

The way in which the program senses what is on the screen is by utilising a double dimensioned variable array. The numbers after the array *sq* are the x and y coordinates of the squares, thus *sq(2,2)* will refer to the square at position (2,2).

As the squares are all four characters in size, and are printed in the middle of the screen, a small formula is used to change the 40 × 25 text positions into the 15 × 13 grid positions.

The value of the grid under the dog at position (x,y) can be found by:

value = sq(x/2-2,y/2-1)

as the dog moves two characters at a time so as to always be on one square, x and y are always even numbers.

The variable *value* will be assigned the code number of whatever object is on the screen at that position. The codes for all the objects are: *0 = space, 1 = dog, 2 = bone, 3 = cat, 4 = dog, 5 = tree, 6 = food.*

The scrolling routine is short, but complicated. Before scrolling can occur, a window has defined around the column that the dog is currently on so that only the correct part of the screen will scroll.

The variable *v* is assigned the value of the code screen position of the square which will disappear.

The rest of the codes are placed in another array which is then fed back into the original array one division out from its original position. The code of the square which has wrapped around is then placed into the vacant array component.

The screen scrolling is simpler. It is scrolled up or down depending on which type has been selected. The missing square is then printed so that the line will not eventually disappear.

The cat positioning routine involves random movement. The direction in which the cat will move is determined by its position. If the cat is near the border of the grid, then the routine moves it away from the edge.

If the cat is in a safe position, it will be moved in a random direction. I did have the routine so that the cat was intelligent and homed in on the dog, but this made the game far too difficult.

In order to make the cat transparent – that is, to restore the character that the cat landed on – the routine calls up the print procedure used by the scrolling routines.

Restoring each square made the game sluggish so I modified the routine so that these were left as spaces. This made the game slightly more difficult . . . and more exciting.

The downloader routine at line 40 may be of use to disc users. This little routine will download a program from any PAGE setting to PAGE &E00.

This can be very useful for long programs which must be saved on disc, but will not work with the DFS workspace.

The *FX138,0,128 command will insert the function 0 definition into the input buffer as if one had just pressed it, and the END statement at line 60 allows this buffer to be cleared and the appropriate action taken.

Full listing starts on Page 171

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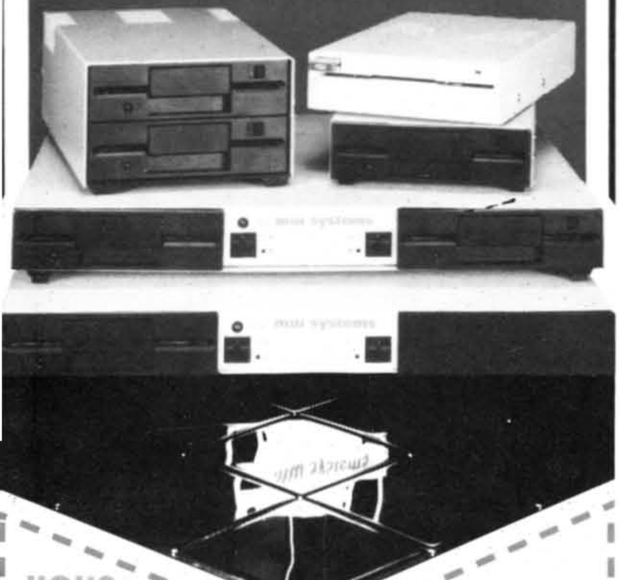

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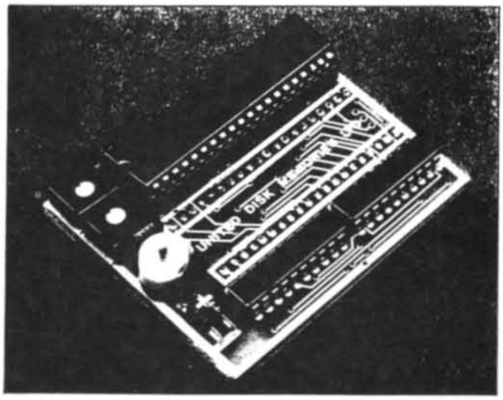

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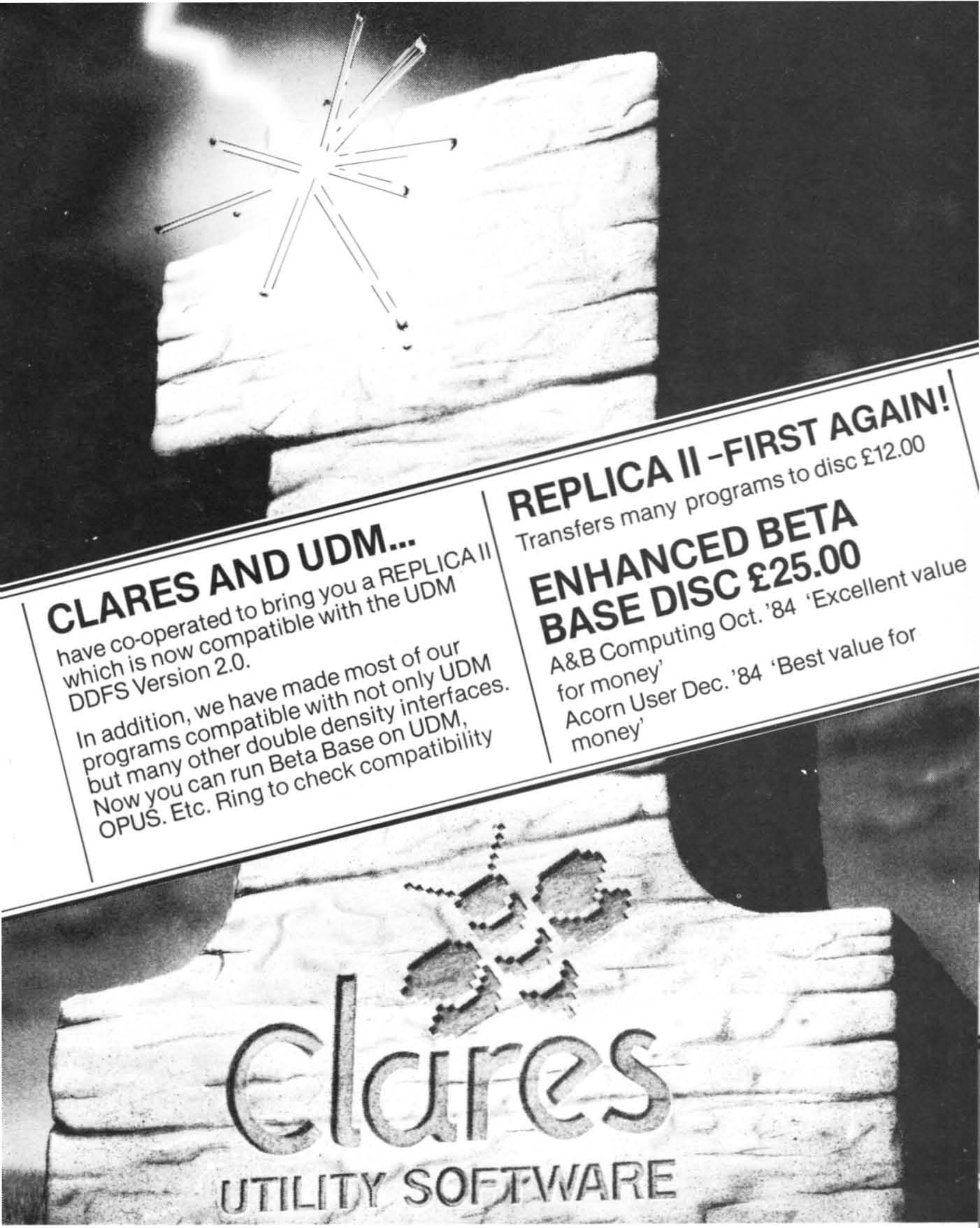

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Under the influence of GCOL 3 and GCOL 4

LAST month we examined how GCOL3 and GCOL4 worked. GCOL3 Exclusive ORs (EOR) the foreground colour specified with that already on the screen. GCOL4 simply inverts the colour that is already there.

In different circumstances this will have different effects, but there is one property they have in common – when under the influence of either, if you perform the same DRAW or PLOT twice, the second time cancels out the first.

In practice we tend to use this property to erase lines in drawing programs – computer aided design (CAD), as the jargon has it.

We simply draw the line we want with, say, GCOL3.1 and if it's not what we desire we rub it out by drawing exactly the same line still with GCOL3.1.

```
 10 REM PROGRAM I
 20 MODE 4
 30 GCOL0,1
 40 MOVE 1000, 0 :MOVE 200, 0
 50 PLOT 85, 1000, 1000
 60 PLOT 85, 200, 1000
 70 REPEAT
 80 FOR height% = 1 TO 4
 90 GCOL3,1
100 MOVE 0, 200 + height%
110 DRAW 1279, 200 + height%
120 NEXT height%
130 wait$=GET$
140 UNTIL 0
```

Program I illustrates the idea. It simply draws a large rectangle (lines 40 to 60) and then rules four lines across it, using GCOL3.1 – that is it EORs logical colour one onto the rectangle (lines 80 to 120).

Now these lines are in a REPEAT ... UNTIL loop (lines 70 to 140) but after initially drawing the lines the loop is prevented by the GET$ in line 130 from being repeated until a key is pressed.

When the lines are first drawn they are in logical colour number zero (1 EOR 1 = 0) where they cross the rectangle, so it appears to have been cut into pieces.

Having pressed a key though the lines are once more drawn across the rectangle. This time the segments that cross the rectangle are being EORed onto colour zero – the result of the last "drawing".

So now the parts of the lines across the rectangle appear in logical colour one, since 1 EOR 0 = 1. The effect of this is to give us a whole rectangle.

Next time round we are once more EORing logical colour one onto itself, and we regain our divided rectangle.

All this should be quite clear from the last article. And I think you'll be able to predict without too much difficulty the effect of changing line 90 to:

```
90 GCOL4,1
```

However bear in mind that GCOL3 and GCOL4 are not identical. To illustrate this, try Program II:

See if you can predict the outcome before you run it. It's virtually identical to Program I, save that we're in Mode 5 (line 20).

We take advantage of the change in mode by varying the colours of our line. The formula *height%–1* in line 90 ensures that the colours of the lines EORed onto the screen are logical colour numbers 0, 1, 2 then 3.

Can you visualise what happens? Suppose we change line 90 to:

```
90 GCOL4, (height% - 1)
```

Can you guess what would happen now? Try it and see.

The main point is that GCOL3 and GCOL4 are different in their effects.

If anything, GCOL3 gives you the more control, since you can "mix" the colour you specify with the colour already there. Whereas with GCOL4 you are simply inverting the colour already on the screen.

```
 10 REM PROGRAM II
 20 MODE 5
 30 GCOL0,1
 40 MOVE 1000, 0 :MOVE 200, 0
 50 PLOT 85, 1000, 1000
 60 PLOT 85, 200, 1000
 70 REPEAT
 80 FOR height% = 1 TO 4
 90 GCOL3,(height%-1)
100 MOVE 0, 200 + height%
110 DRAW 1279, 200 + height%
120 NEXT height%
130 wait$=GET$
140 UNTIL 0
```

A good application of the ability of these two GCOL statements to "self-erase" is when you have a pointer rotating around a dial. Look at Program III.

If when you're entering it you initially end with line 80 and run the program, you'll see that the first few lines simply draw a circle.

Go through it carefully until you can see how it works. Briefly, it draws a 36 sided polygon – which is close enough to a circle for our purposes. The method is fully explained in my October 1983 article on graphics.

Line 40 moves the graphics origin to the centre of the screen.

If you now type in the rest of the program and run it you see that a pointer appears, rotating anti-clockwise like the hands of an indisciplined clock.

```
   10 REM PROGRAM III
   20 MODE 4
   30 radius%=400
   40 VDU 29,640;512;
   50 MOVE radius%,0
   60 FOR angle = 0 TO 360 STEP 10
   70 DRAW radius% * COS(RAD(angle)) .
radius% * SIN(RAD(angle))
   80 NEXT
   90 angle=0
  100 GCOL3,1
  110 REPEAT
  120 IF angle < 350 THEN angle =
angle+10 ELSE angle=0
  130 MOVE 0.0
  140 DRAW radius% * COS(RAD(angle)) .
radius% * SIN(RAD(angle))
  150 FOR wait%=0 TO 400 :NEXT
  160 MOVE 0,0
  170 DRAW radius% * COS(RAD(angle)) ,
radius% * SIN(RAD(angle))
  190 UNTIL 0
```

What we're doing is drawing a radius from the centre of the circle to the circumference (lines 130 to 140). We then wait for a while with a dummy loop (line 150), so we can see the line.

Next we redraw it from the centre to the circumference – but as we're under GCOL3 (line 100) this simply unplots our previous line.

Now this whole draw, undraw routine is in a REPEAT . . . UNTIL loop (lines 110 to 180).

However each time through the loop line 120 intervenes to increase *angle* – that is, how far round the "face" the arm is – by 10 degrees.

Once we've plotted for 350 degrees though, we restore *angle* to 0 degrees, since 0 degrees is the same as 360 degrees, where our next increment of 10 degrees would take us (still line 120).

After all, getting back to where we started is the whole point of going round in circles!

Again, try it with GCOL4 in place of GCOL3.

One of the nice things about this type of plotting is that we can use the techniques to pass over "background" objects and leave them totally unchanged. To see this, add the following line to Program III:

```
85 MOVE 50, -100: MOVE 50, 100: PLOT
 85, 200, -100
```

These techniques are ideal for the scanners of your intergalactic battle cruiser, aren't they? As a challenge, why not tinker with the above to turn the program into a clock?

One of the most useful applications of these techniques is in "rubber banding". This is just a way of drawing lines on your screen that allows you to "slide and stretch" them back and forth until you get them to fit exactly where you want.

Program IV draws a line from the centre of the screen to a cross-shaped cursor defined in line 30. Now you can shift this cursor about the screen by using the cursor keys. The *FX4,1 of line 80 allows them to return Ascii values.

```
   10 REM PROGRAM IV
   20 MODE 0
   30 VDU 23, 224, 24, 24, 24, 255,
255, 24, 24, 24
   40 oldx=640: oldv=512
   50 newx=640: newy=512
   60 MOVE oldx,oldv
   70 fix=FALSE
   80 *FX4,1
   90 VDU 5
  100 GCOL3,1
  110 REPEAT
  120 PROCinput
  130 UNTIL fix
  140 *FX4,0
  150 VDU4
  160 END
  170 REM ==========================
  180 DEF PROCline
  190 MOVE oldx,oldv
  200 DRAW newx,newy
  210 ENDPROC
  220 REM ==========================
  230 DEF PROCinput
  240 MOVE newx-8,newv+16:VDU 224
  250 key=GET
  260 MOVE newx-8,newy+16:VDU 224
  270 PROCline
  280 IF key=135 THEN fix=TRUE
  290 IF key=136 THEN IF newx>15 THEN
newx=newx-16
  300 IF key=137 THEN IF newx<1263
THEN newx=newx+16
  310 IF kev=138 THEN IF newv>15 THEN
newy=newy-16
  320 IF kev=139 THEN IF newy<1007
THEN newy=newy+16
  330 PROCline
  340 ENDPROC
```

The position of the cursor is determined by *newx* and *newy*.

As you can see, lines 290 to 320 of PROCinput vary their values depending on the key pressed (line 250). PROCinput is in a REPEAT . . . UNTIL loop so let's see what happens. Remembering we're using GCOL3 (line 100).

Line 240 draws the cursor. The –8 and +16 offsets are to ensure that the centre of the cross is at *newx, newy*. That is, *newx–8, newy+16* are the top left coordinates of the user-defined character printed by that line's VDU 244 (notice we're under VDU 5 – line 90).

Line 250 then waits for a key to be pressed. Once it has been pressed line 260 reprints the cross in the same position – but because of the GCOL3 it disappears, ready for us to move it in accordance with the cursor key that's been "got".

PROCline of 270 simply draws a line from *oldx, oldy* – which in this program never vary from the centre of the screen – to *newx, newy*.

This may seem a bit odd, since we've not taken into account the cursor's "move", but in practise this will be the deleting line, going over a line we've already drawn.

At the beginning, *oldx, oldy* and *newx, newy* coincide, so in effect no line is drawn.

Lines 290 to 320 calculate the cursor's new position and ensure it doesn't go off screen.

The PROCline of 330 then draws the line from the centre of the screen to the circle.

The next time through the procedure, after the key press, line 270 redraws – and hence wipes out – the last line. After the adjustments of 290-320, line 330 draws the new line.

The effect has to be seen to be appreciated.

As you direct the cursor round the screen a seemingly elastic line constantly joins it to the centre – hence the term "rubber banding".

If we should wish to freeze our line in one position we just press the Copy key. Line 280 then sets the logical variable *fix* to TRUE, which causes us to drop

→

From Page 123

out of the REPEAT . . . UNTIL (line 130).

You may be wondering what happens if you press other keys – after all PROCinput doesn't test for the legality of keys.

If you look carefully you'll see that all that happens is that 270 erases the line and then 330 draws it back in the same place.

Lines 140 and 150 simply restore the cursor keys and cursor movement to the status quo ante program.

There's far more potential than this though. Suppose that when we'd fixed our line we then started a new line from the last position of the cursor. Then when we'd fixed that we could start a new line from the end of that and so on . . . we'd have a computer etch-a-sketch!

It's not all that difficult. Program V has what's needed.

It's much the same as Program IV – the new lines have the new line numbers. In essence we're repeating the main

```
   10 REM PROGRAM V
   20 MODE 0
   30 VDU 23, 224, 24, 24, 24, 255,
255, 24, 24, 24
   40 oldx=640: oldy=512
   50 newx=640: newy=512
   60 MOVE oldx,oldv
   70 fix=FALSE: end =FALSE
   80 *FX4,1
   90 VDU 5
  100 GCOL3,1
  105 REPEAT
  110 REPEAT
  120 PROCinput
  130 UNTIL fix OR end
  135 GCOL0,1: PROCline: GCOL3,1
  136 oldx=newx: oldy=newy: fix=FALSE
  137 UNTIL end
  140 *FX4,0
  150 VDU4
  160 END
  170 REM ========================
  180 DEF PROCline
  190 MOVE oldx,oldy
  200 DRAW newx,newy
  210 ENDPROC
  220 REM ========================
  230 DEF PROCinput
  240 MOVE newx-8,newy+16:VDU 224
  250 key=GET
  260 MOVE newx-8,newy+16:VDU 224
  270 PROCline
  280 IF key=135 THEN fix=TRUE
  290 IF key=136 THEN IF newx>15 THEN
newx=newx-16
  300 IF key=137 THEN IF newx<1263
THEN newx=newx+16
  310 IF key=138 THEN IF newy>15 THEN
newy=newy-16
  320 IF key=139 THEN IF newy<1007
THEN newy=newy+16
  325 IF key=65 THEN end=TRUE
  330 PROCline
  340 ENDPROC
```

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VI.4 STARSTICK was 4K the new version has been squashed into 8K.

The NEW ISSUE ROM is compatible with latest* ACORNSOFT programs as well as REPLICA II.

As with the VI41 issue of ROM you can at last connect good "self centring", "rapid action" joysticks to the BBC Computer via the user port. (Model A owners please note that you do not need the analogue interface fitted to your computer but you will need the user port and IC76).

Pressing any combination of the BREAK key does not effect the STARSTICK software and now by pressing TAB-BREAK REPLICA II is auto booted and is compatible with the STARSTICK ROM V2+.

The software patch provided in the ROM monitors O.S. calls and patches the Joystick to the Games programs, and so will work with most games programs even programs not meant to function with Joysticks (except those using illegal direct memory addressing).

The new command summary and description is:–

*STICK	enables the ROM.
*NSTICK	dissables the ROM.
*SETSTICK	program joystick.
*KSAVE	save protocols set by *SETSTICK.
*KLOAD	load protocols saved by *KSAVE.
*MAP	remap current keyboard definitions. play games using your favourite keys.
*CLEVER	intelligent loading of software (ensuring ACORN compatibility).
*PLONK	relocate area of work memory used.
*PROP1	proportional joystick emmulator 1.
*PROP2	proportional joystick emmulator 2.
*ANA	patches joysticks via the analogue port to games.
*KILL	ROM manager, dissables troublesome ROMs.
*DOUBLE	replace up to two joysticks.
TAB-BREAK	Auto boots REPLICA II.
*PAUSE	define key to freeze game.
*NPAUSE	dissable *PAUSE.
*NAME	predefined key protocols.
*HELP KEYS	display current key protocols.
*REPEAT	enables ROM based auto repeat.
*NREPEAT	dissables *REPEAT.

Should a contention state occur when two roms or more try to use the same *command prefixing any of the above with M will help solve the problem.

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Large picture shows BBC Computer System and a Quickshot II Joystick. Small inset just a few of the joysticks that will work with the patch lead. Screenshot by kind permission of SUPERIOR SOFTWARE

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'And of course, no-one's perfect'

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body of Program IV. Lines 105 and 137 form the new REPEAT ... UNTIL loop.

This time we won't want to finish the program every time we fix a line. so we have another logical variable. *end*.

If you compare Programs IV and V you see that the first difference between them is in the UNTIL of line 130 which has the extra condition OR *end* attached.

Let's suppose we've just started the program and have moved our cursor to a position where we want to fix a line. So far everything has gone on as in Program IV.

Once we press Copy though. we drop out of the inner REPEAT ...UNTIL loop (lines 110 to 130). We then change to the "standard" GCOL0 to draw the line and then revert to GCOL3 (line 135).

Line 136 contains the clever bit. We then move the starting point of our new line to the end of the line we've fixed by setting *oldx* equal to *newx* and *oldy* equal to *newy*. Next time we'll start rubber banding from the "free" end of the last line.

Notice also that we set *fix* to FALSE again. If we didn't we'd just keep dropping through the inner loop. never getting anywhere. Leave it out and see!

Line 137 tests to see if *end* is TRUE. dropping through to finish if so.

Line 325 in PROCinput tests for the ending condition – pressing A for "abort".

Even with this rudimentary program you can have a lot of fun. but there are limitations.

For instance. every line follows on from the end of the preceding one.

It would be much more convenient if we could turn off the line until we'd moved the cursor into a new position. How else could we. for example. draw a box within a box?

And of course. no one's perfect – we might want to delete a line.

Program VI incorporates these refinements. To do so we've introduced two new logical variables. *line* and *delete*. (Notice that the terminating conditions for our inner loop – line 70 – now involve *delete*.)

If line is TRUE. when the cursor moves a line rubber bands to it. If it is false. the cursor moves with no attached line.

We use the Return key to toggle between the two states (line 460). Line 470 then either draws the line or sets the cursor coordinates to its new position as appropriate. The actual drawing of a "fixed" line is done by line 80.

You will probably have noticed that. when using these techniques. if you draw a line exactly over another line they disappear. This is because of the GCOL3 effect of which we are taking advantage. As soon as you move the top line off however. the line underneath reappears.

If you really did want to erase this line all you would have to do is press "D". which then sets *delete* to TRUE (line 450).

You will then drop out of the inner loop and line 90 will draw the line in the background colour – that is erase it – with GCOL0.0. then restore GCOL3.1.

However you came out of the inner loop. lines 100 to 110 move the start coordinates to their new position and line 120 restores the logical variables *fix* and *delete* to their default values.

The program. though short. is by no means a simple one. so persevere – the ideas behind it are very important.

Don't worry about the PLOT 13 in PROCline for the moment. we'll cover it in a later article.

That's all for this month. In the next article I'll be looking at some more uses of GCOL.

```
   10 REM PROGRAM VI
   20 MODE 0
   30 PROCinitialise
   40 REPEAT
   50 REPEAT
   60 PROCinput
   70 UNTIL fix OR end OR delete
   80 IF fix AND line THEN GCOL0,1:
PROCline: GCOL3,1
   90 IF delete THEN GCOL0,0:
PROCline: GCOL3,1
  100 oldx=newx
  110 oldy=newy
  120 fix=FALSE:delete=FALSE
  130 UNTIL end
  140 *FX4,0
  150 VDU 4
  160 END
  170 REM ===========================
  180 DEF PROCinitialise
  190 VDU 23, 224, 24, 24, 24, 255,
255, 24, 24, 24

  200 end=FALSE: line=FALSE :fix=FALSE
:delete=FALSE
  210 oldx=640:oldy=512
  220 newx=640:newy=512
  230 MOVE oldx,oldy
  240 *FX4,1
  250 VDU 5
  260 GCOL3,1
  270 ENDPROC
  280 REM ===========================
  290 DEF PROCline
  300 MOVE oldx,oldy
  310 PLOT13, newx,newy
  320 ENDPROC
  330 REM ===========================
  340 DEF PROCinput
  350 MOVE newx-8,newy+16:VDU 224
  360 key=GET
  370 MOVE newx-8,newy+16:VDU 224
  380 IF line THEN PROCline
  390 IF key=135 THEN fix=TRUE
  400 IF key=136 THEN IF newx>15 THEN
newx=newx-16
  410 IF key=137 THEN IF newx<1263
THEN newx=newx+16
  420 IF key=138 THEN IF newy>15 THEN
newy=newy-16
  430 IF key=139 THEN IF newy<1007
THEN newy=newy+16
  440 IF key=65 THEN end=TRUE
  450 IF key=68 THEN delete=TRUE
  460 IF key=13 THEN line=NOT line
  470 IF line THEN PROCline  ELSE
oldx=newx:oldy=newy
  480 ENDPROC
```

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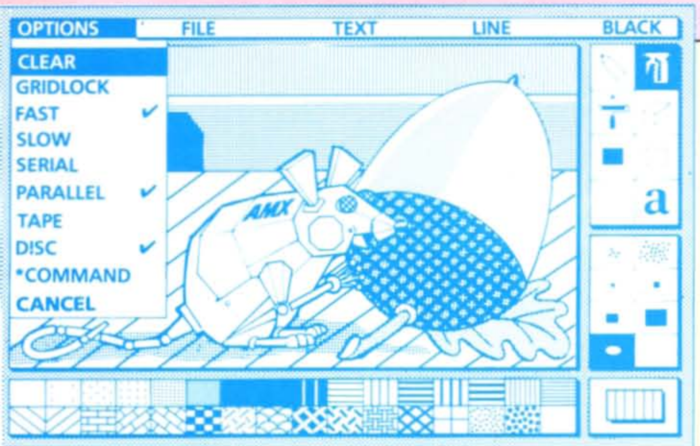


There's a mouse in the house!

. . . and ALAN McLACHLAN welcomes it with open arms

WHEN the opportunity came to put the Advanced Memory Systems' AMX Mouse through its paces I leapt at it with enthusiasm since I'd already seen the amazing screen dumps in December's *Micro User*.

As with most outstanding ideas, the concept behind this one is simple. You use the mouse to control the position of the cursor on the screen for a variety of different applications.

The mouse itself is a mechanical device which can be moved by one hand over a desk or any flat surface. It is a sort of liberated joystick fitting easily within the palm of your hand, although it is far more sensitive and natural than an ordinary joystick.

Inserted in its belly is a sensitive trak ball arrangement which, when rotated by rolling over a surface, moves the pointer or cursor to any screen position. The mouse plugs into the user port and the 4ft cable leaves ample room for movement.

The package, consisting of mouse, a ROM and additional software programs on cassette or disc, is suitable for use with any BBC model B with operating system 1.2 and it is compatible with the second processor. Enabled and disabled by a simple *Command, it does not interfere with the micro's normal operation.

The ROM contains fast action machine code routines to create windows, icons and pointers on screen – icon is the term for a symbol or mini picture. When used creatively in menu options and the like they make programs far more user friendly.

There are 64 icons already stored in the ROM, and they can be supplemented by using the Icon Designer program which is part of the software package that comes with it.

In its simplest form without the use of any other software the mouse may be used instead of the normal cursor keys. This is achieved by entering *MOUSE ON and *MCURSOR ON. The former turns the mouse on and the latter hands control of the cursor over to it.

The mouse has three fire buttons which can be programmed to simulate three separate keys. For example, you may choose the Return, Copy and Delete keys for use in editing.

Among the many useful commands in ROM is *WINDOW which incorporates windows in your programs. A pointer can also be implemented by typing in *POINTER ON and *SHOWPOINTER. The first command initialises the pointer, the second displays it (it can be removed from the screen with *HIDE POINTER). Using this you can for example move your pointer to an icon of a waste bin to delete a file.

The mouse really comes into its own when used with its accompanying software packages. When Icon Designer is selected the screen displays six windows of various sizes and two icons – a disc drive and a waste bin. The screen format is as shown in Figure I.

Each window has a different function. The largest, used to design your icons, is labelled with the current icon number. To the right is a small window which shows the size of the icon you are creating.

At the base of the screen are two further windows which will store the icons being worked on. Uppermost is the current set and the lower contains an alternative set.

To alter an icon simply use the mouse to position the pointer over the required icon in the lower window, hold down the "move" button and drag the icon across to the design window. There it is immediately displayed in an enlarged form labelled with its number.

If you move the pointer over any of

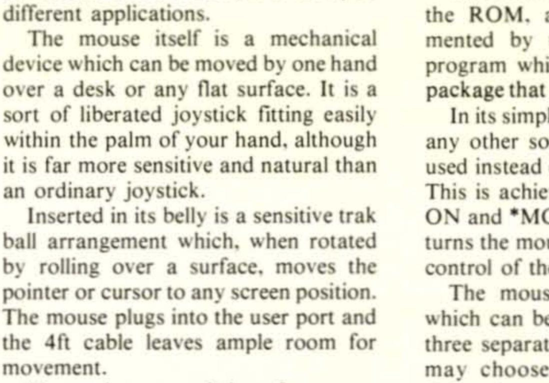


Figure I

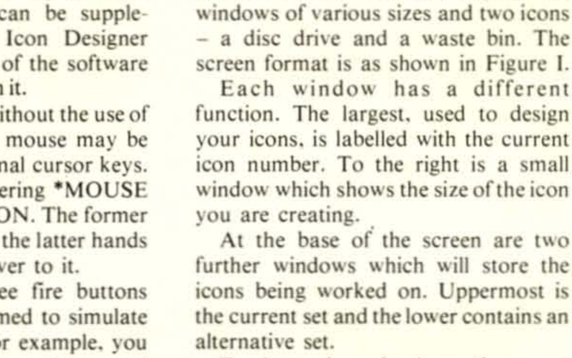


Figure II

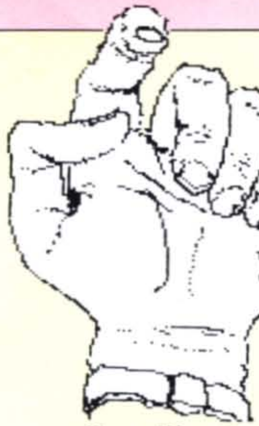
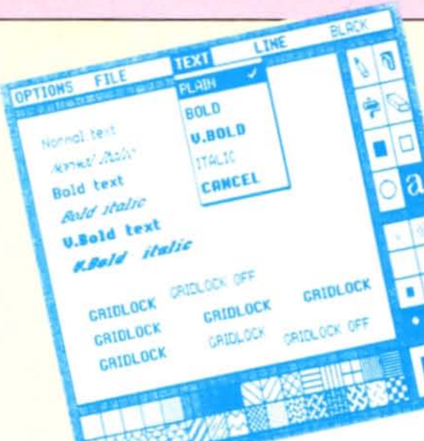
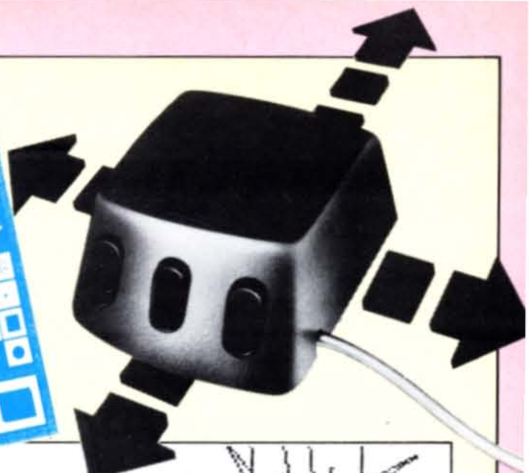


Figure III





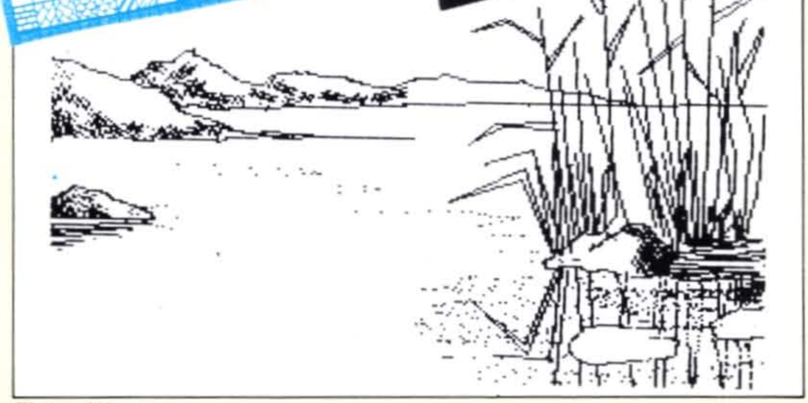


Figure IV

the black squares which make up the icon and press the execute button, the colour of the square will be inverted.

The execute button toggles between black and white in this fashion to enable you to create your own icon as required. The program is in fact a very sophisticated character definer.

When you are satisfied with the character, you simply pick it up using the pointer again, and put it into the upper icon store where the new version will overwrite the old one.

To save the new set to disc simply move the pointer to the disc drive icon, press execute and use the prompt to "Save Icons". You can in fact save as many sets of icons as you wish, taking care to save each under a different file name.

The software comes equipped with two sets of icons already and these can be loaded and manipulated to suit individual tastes.

The second item of software, Art Designer, is an advanced drawing program with a wide range of uses in the preparation of illustrations, and for technical drawing. Even if you don't intend to it use for such serious applications you'll find this part of the package totally compulsive and incredible fun. I did, and so did my children – spending lots of time at the machine just doodling and painting.

Of course all commands are available on screen in the form of icons, which can be selected by means of the mouse and its buttons. The screen displays a large drawing board (Figure II), surrounded by the full range of icons that will be used, and four menu options.

Drawing facilities include a Pencil with rubber-banding, a Spray with eight different nozzles and a Paint Roller with 32 on-screen patterns to choose from. There is also an Eraser, a Box and Frame mode, a Circle, and six text styles, all chosen via the pointer. An Options menu allows you to select Clear the picture, Fast or Slow mouse response, Serial or Parallel printer dumps, Tape or Disc filing and the facility to enter *Commands.

The Text menu allows selection of three styles in normal or italic fonts, while the Line menu gives a choice of full, dotted, black, white or inverted. The menus themselves are quite natty. You pull them down rather like a roller blind, then having made your selection they roll up to reveal your original artwork underneath.

Despite the vast range of options, the program is simplicity itself and the user manual provided is virtually redundant. It is impossible to do this part of the package in such a short review, so I've let the screen dumps speak for themselves. My young son was very soon at home with it and created the free-hand (sorry) drawing shown in Figure III, while my own humble offering is in Figure IV.

Even though this device has obvious applications for technical drawing or filing systems, my family and I got a great deal of fun out of it just using it to create pictures and patterns which we saved for future viewing.

The sensitivity of the mouse itself accounted for the high quality of the artwork, far better than we could ever have achieved with a lightpen.

All in all the mouse has become a permanent fixture in my micro *(Editor please note.)* Simple yet powerful, this is the one product I've met where the computer cliche really is true: Its potential is only limited by your own imagination.

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BACKGAMMON *Revisited*

By SYLVIA CLEMENTS

Now we present a two-player version of this classic game – and with it comes a marvellous opportunity to study the BBC Micro's *SPOOL command

IN October's Micromail we published a letter from W.J. Russell in which he asked if the Backgammon program from the July 1984 edition of *The Micro User* could be modified for two players.

Naturally we passed the buck, asking if any of our talented readers could rise to the challenge.

Within four weeks Sylvia Clements had come up with the required modifications, details of which follow.

Because of memory problems a lot of short lines have been put into multi-statement lines and certain lines have had to be deleted – including those containing the instructions. As these were published in the July article, it's no great loss.

The reason for the pruning was in order to accommodate a complete new procedure for the second player, PROCp12.

The final result is a two player version of what has already proved to be a highly professional and popular game.

In order to make the alterations we're going to use *SPOOL to merge the extra lines in – a simple process, yet one which seems to baffle many people.

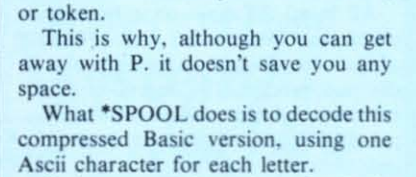
Normally, when you type in a Basic program, the BBC Micro stores it in a special way. Never mind that you took five characters to type in PRINT, the BBC remembers it as just one character, or token.

This is why, although you can get away with P. it doesn't save you any space.

What *SPOOL does is to decode this compressed Basic version, using one Ascii character for each letter.

So in a spooled version of a Basic program, PRINT would be represented by five Ascii characters.

It can be very useful having programs in this longhand form particularly when, as in this case, we want to blend one program into another.



```
          KEYS
A - X   Selects counter to be moved
  Y     Moves from the bar
  Z     Surrenders move
```

To get the program you want into spooled form, you must first have it in memory.

Now the process involves saving the file again in its new form, so have a new filename ready. Don't overwrite your original Basic file as you might want to make alterations to it later.

Right, let's suppose the program you want to spool – called LINES, say – is in memory, and you want the spooled version to be called MODS.

Type:

```
*SPOOL MODS
```

followed by:

```
LIST
```

and to round off:

```
*SPOOL
```

(no file name this time.)

On cassette versions just follow the "Press Play and Record" prompts.

The outcome should be a spooled Ascii version of your original program saved under the name MODS.

If you now try something like:

```
LOAD "MODS"
```

you'll get:

Bad Program

You see, it just isn't stored in the format Basic wants its programs to be in.

However you can type MODS into the micro as if you were actually banging away at the keyboard by entering:

```
*EXEC MODS
```

If you look at the screen, you'll see that each line of the program in MODS appears on the screen, followed by a carriage return.

When you think about it, that's exactly how you enter a program. Type in the line letter by letter – for example, five characters for PRINT – and the micro automatically stores it in its special Basic form.

So when you *EXEC MODS, each line of the original program – now in Ascii form – gets typed into your micro and converted to Basic.

The end result is that you're left with a Basic version of the spooled file MODS identical to LINES – as you'll see when you list it.

By the way, ignore any Syntax error messages and what-not that appear on the screen while you're *EXECing – that's just the way the system works.

You might wonder what's the point of going round the houses in this way, just to end up with what you've started.

Well the way you alter a Basic program is to re-type the lines you want altering and press Return.

The new version of the line replaces the old, or, if the new line has a line number that doesn't exist in the original program, it simply takes up its correct place in the program listing.

Now let's suppose that the program you've just spooled contained modifications to another program – which we'll call ORIGIN.

Perhaps there are altered versions of lines – which will share the same line numbers as the originals in ORIGIN – and some entirely new lines, whose numbers don't appear in ORIGIN.

If you:

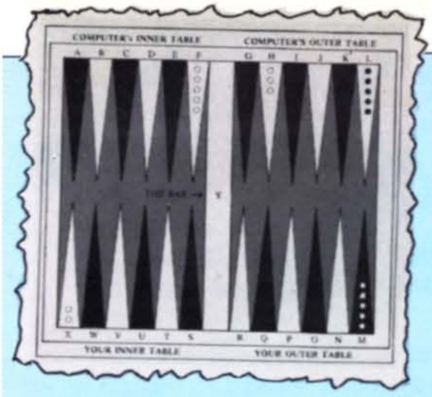
```
LOAD "ORIGIN"
```

into memory, then:

```
*EXEC MODS
```

will type out the spooled version of each altered line followed by Return – just the way you'd type in alterations to a program from the keyboard.

The altered lines from MODS will then replace the original lines in



ORIGIN (which share the same line numbers). And of course any totally new lines in MODS will take up their appropriate spot in the listing.

In other words, it's exactly as if the modifications had been typed from the keyboard.

In this way you incorporate the alterations into ORIGIN, leaving an updated Basic program in memory at the end of it. The process may seem complex and longwinded, but once you get used to it it's quite straightforward.

So much for theory. Here it is in practice:

Type in Listing I and save it as LINES. (Although you don't strictly have to save the Basic version, it's handy to have around if you need to alter it to take into account typing errors and so on).

Next:

```
*SPOOL MODS
LIST
*SPOOL
```

following any prompts to save a spooled Ascii version of the alterations on tape or disc.

Load your original version of Backgammon and, following our line numbering in the July 1984 issue:

☐ Delete lines 50-80, and 110.

☐ Make lines 150 to 200 into one multi-statement line. Similarly with lines 210 to 250, and 280 to 310. Note that lines 260 and 270 remain as they are. Delete 3090 to 3270.

☐ Also, to make room, delete all the blank lines, all unnecessary spaces, lines with just a colon and REMs. Now you've made all these changes you might want to save it, just in case.

Now, with this altered version of Backgammon still in memory:

```
*EXEC MODS
```

Ignore the syntax error messages, and when all the furore has died down you should be left with a two player, Basic version of Backgammon. Save it!

In case all this seems too much trouble, it might interest you to know that the two player version of the game appears on this month's cassette. See the order form on Page 197 for details.

```
   10 INPUT TAB(3,10)"ONE PLAYER OR T
WO (1 or 2)"PLAYERS
   15 IF PLAYERS=2 THEN P%=1:GOTO30
   20 IF PLAYERS=1 THEN P%=0
   40 MODE6:PROCinitial:MODE1:VDU19,2
,2;0;23;11,0;0;0;0
  100 PRINT''':END
  400 IF P%=0 PROCme ELSE PROCpl2
  405 IF Cp=0 THEN 530
  450 A$="PLAYER 1":Yw=Yw+1:X%=50*Cb
  530 IF P%=1 A$="PLAYER 2" ELSE A$="
I"
  535 Mw=Mw+1:X%=50*Hb
  642 IF P%=1 PRINT TAB(1,7) "PLAYER
2..",Mw,Mp:GOTO660
  702 IF Z%=14 ENDPROC ELSE CLS: INPU
T TAB(1,13) "1 Player or 2? (1/2)" nu
m
  704 REPEAT UNTIL num=1 OR num=2
  706 IF num=1 AND P%=1 Mw=0:Mp=0:Yw=
0:Yp=0:P%=0:ENDPROC ELSE IF num=1 AND
 P%=0 ENDPROC
  708 IF P%=1 ENDPROC ELSE P%=1:Mw=0:
Mp=0:Yw=0:Yp=0:ENDPROC
 1520 PROCinfo("It's Player 1's move.
..")
 1570 PROCinfo("Player 1's move with
the "+STR$(D1%)+" : ")
 1910 PROCinfo("You have a piece high
er up inner table")
 2070 IF Flag%=2 THEN PROCinfo("Ouch
!!"): PROCwait
 4000 DEFPROCpl2
 4010 PROCinfo("It's Player 2's turn"
)
 4020 IF Flag% THEN PROCdice
 4030 Flag%=1:Swop%=0
 4040 IF D1%=D2% THEN M%=4 ELSE M%=2
 4050 PROCwait
 4060 PROCinfo("Player 2's move with
the "+STR$(D1%)+" : ")
 4070 PROCin
 4080 IF Z%<26 THEN4130
 4090 IF Swop%=0 THEN PROCswop: GOTO4
060
 4100 PROCinfo("Apparently you can't
move ??")
 4110 PROCwait
 4120 ENDPROC
 4130 IF Z%<25 THEN4210
 4140 IF Cb>0 THEN 4170
 4150 PROCinfo("You have no piece on
the bar")
 4160 GOTO4050
 4170 IF A%(25-D1%)=-1 OR A%(25-D1%)
>-1 GOTO4180 ELSE PROCinfo("Sorry,tha
t point is blocked"):GOTO4050
 4180 Z%=25:Cb=Cb-1
 4190 PROCbar(15,225,Cb)
 4200 GOTO4500
 4210 IF Cb=0 THEN 4240
 4220 PROCinfo("You can't move-your o
n the bar")
 4230 GOTO4050
 4240 IF A%(Z%)>0 THEN4270
 4250 PROCinfo("You have no piece the
re!!")
 4260 GOTO4050
 4270 IF Z%-D1%>0 THEN4460
 4280 Temp%=0
 4290 FOR I%=6 TO 1 STEP-1
 4300 IF A%(I%)>0 THEN Temp%= Temp%+A
%(I%):X%=I%
 4310 NEXT
 4320 IF Temp%=Cp THEN 4350
 4330 PROCinfo("That move is off the
board!!")
 4340 GOTO4050
 4350 Temp%=0
 4360 FOR I%=6 TO Z%+1 STEP-1
 4370 IF A%(I%)>0 THEN Temp%=I%
 4380 NEXT
 4390 IF (Temp%=0)OR (Z%-D1%=0) THEN
4420
 4400 PROCinfo("You have a piece high
er up the table")
 4410 GOTO4050
 4420 Cp=Cp-1:IF Cp=0 THEN ENDPROC
 4430 A%(Z%)=A%(Z%)-2
 4440 GOTO4540
 4460 IF A%(Z%-D1%)>-2THEN4490
 4470 PROCinfo("Sorry,that point is b
locked")
 4480 GOTO4050
 4490 A%(Z%)=A%(Z%)-1: PROCpiece(Z%)
 4500 Z%=Z%-D1%:IF A%(Z%)<>-1 THEN454
0
 4510 A%(Z%)=0
 4520 PROCpiece(Z%)
 4530 Hb=Hb+1:Flag%=2
 4540 A%(Z%)=A%(Z%)+1:M%=M%-1
 4550 PROCpiece(Z%)
 4560 PROCbar(17,224,Hb)
 4570 IF Flag%=2 THEN PROCinfo ("Take
 that!!!!"):PROCwait
 4580 Flag%=1:D1%=D2%:IF M%>0 THEN406
0
 4590 ENDPROC
```

This month's cassette tape offer includes the complete two-player version of Backgammon. See order form on Page 197

AMX ART

AMX MOUSE

The AMX MOUSE is an advanced opto-mechanical device which brings to the B.B.C. micro facilities hitherto only available on more expensive machines. It enables you to use advanced features such as ICONS, WINDOWS, and POINTERS in your own programs.

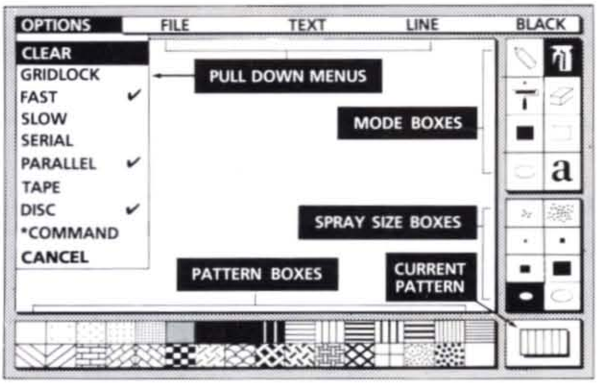
The AMX MOUSE can be used with ordinary programs to replace the cursor keys and with the AMX software it turns the B.B.C. micro into a far more user-friendly device, enabling beginners to quickly learn to use the computer for a wide range of purposes, including COMPUTER AIDED DESIGN, Word Processing, and a host of business uses – to say nothing of its inclusion in games software.

A further range of software will be released in 1985. Starting with "DESK TOP MANAGER".

THE AMX MOUSE PACKAGE

The AMX MOUSE – an advanced three buttoned mouse which simply plugs into the B.B.C. user port drawing its power from the computer.

AMX ART GRAPHICS PROGRAM



The AMX ROM – contains fast machine code routines for creating on screen windows, icons, and pointers and enables the MOUSE button to be programmed for use with commerial software such as Wordwise and VIEW.

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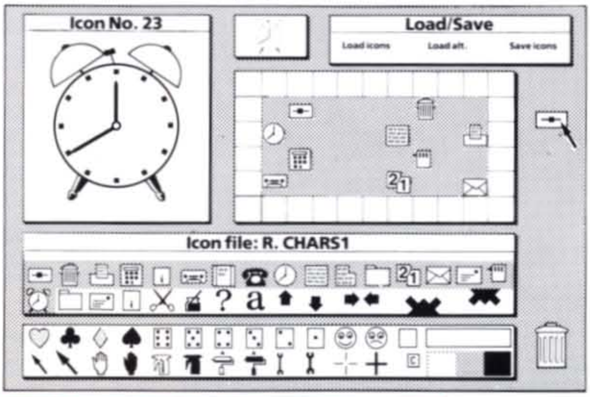
A MANUAL describing how to operate the MOUSE and the ROM routines which are available in both basic and machine code programs.

AMX ART – a superb computer aided drawing program on both tape cassette and a $5\frac{1}{4}$" floppy disc with its own manual. It is suitable for a wide range of uses including preparation of illustrations, architectural and engineering detail drawings, teachers' worksheets, and just creating your own pictures. It soon becomes addictive.

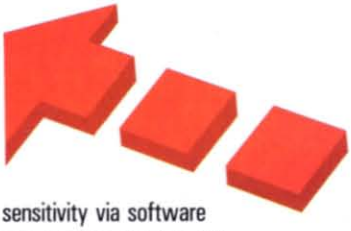
AMX ART includes full use of on screen menu boxes, icons, and pull down menus so that beginners find it very easy to learn and gain confidence in the use of the B.B.C. Micro.

An ICON DESIGNER program which enables you to create and store icons for use in your own programs.



ICON DESIGN PROGRAM

TECHNICAL REQUIREMENTS

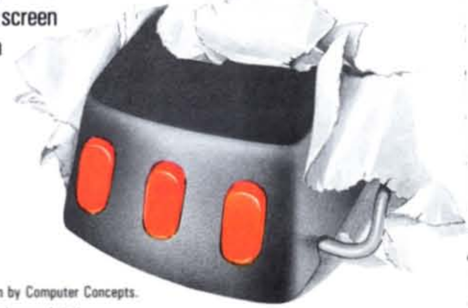


The AMX MOUSE can be used with any B.B.C. Model B computer fitted with the Operation System 1.2 and is compatible with the second processor and disc or tape filing systems.

The AMX MOUSE is adjustable for sensitivity via software control and three buttons can be programmed to simulate 24 different key codes.

The AMX MOUSE may be disabled by a simple software command and will then not interfere with normal operation of the computer.

The AMX ART programme enables users to print out screen displays using any Epsom compatible dot-matrix printer. Owners of non-standard printers may use their own screen dump routines.



'Wordwise' is a wordprocessing program by Computer Concepts.
'View' is a word processing program by Acornsoft Ltd.

AMX MOUSE

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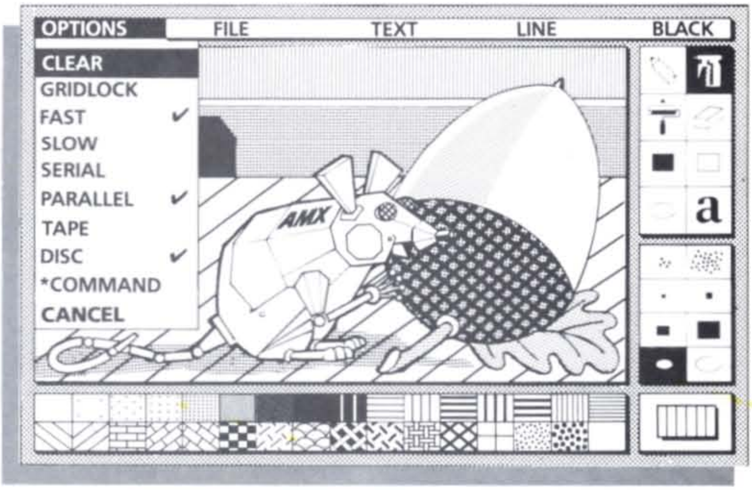
FOR THE BBC MICRO MODEL B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LINE
BLACK
CLEAR
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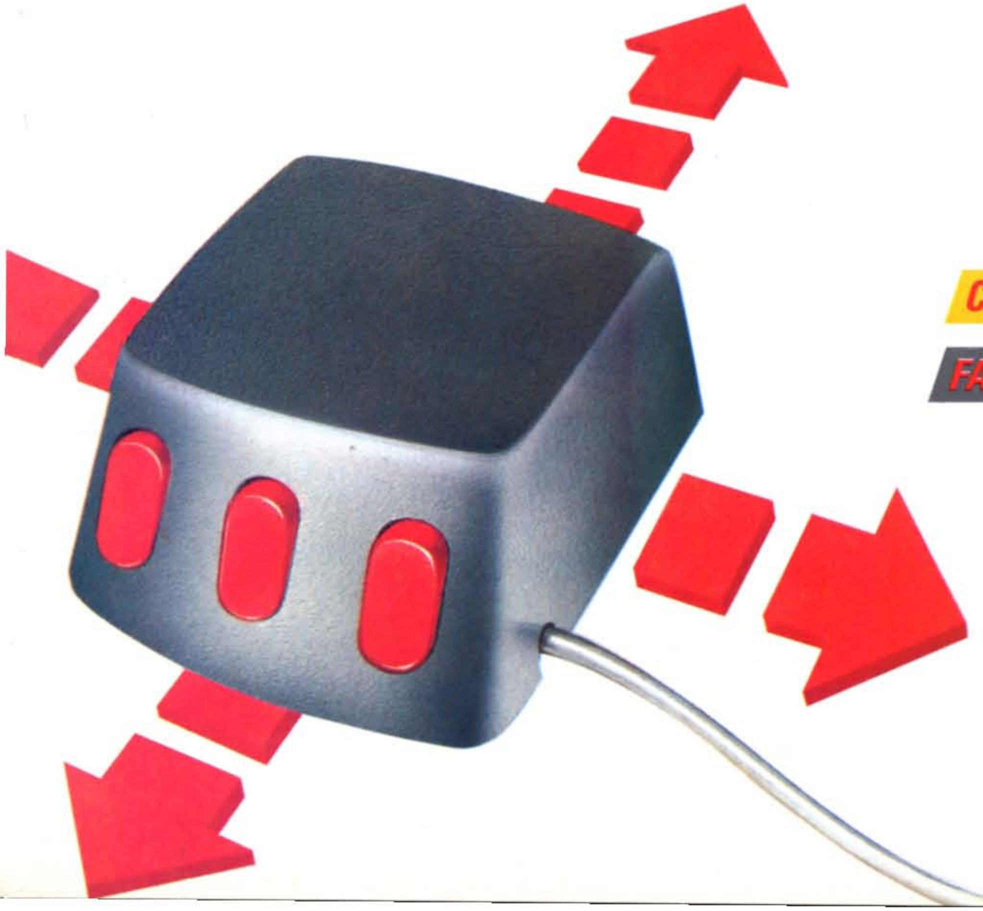
CANCEL
AMX
a

with AMX ART GRAPHICS PROGRAM



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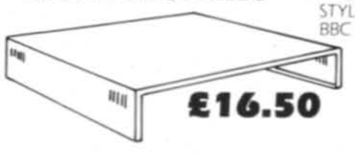

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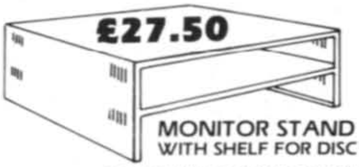

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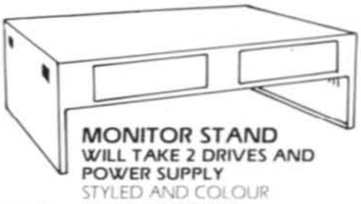

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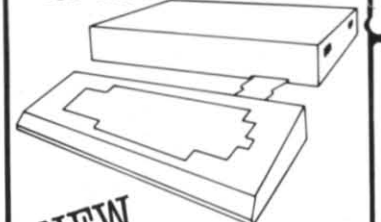

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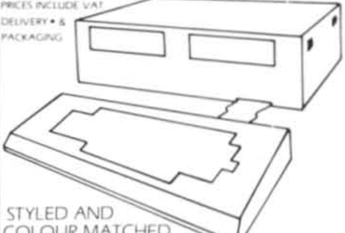

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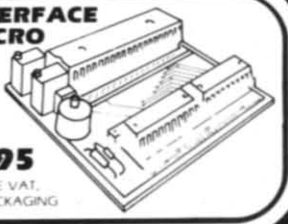

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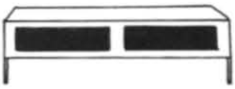

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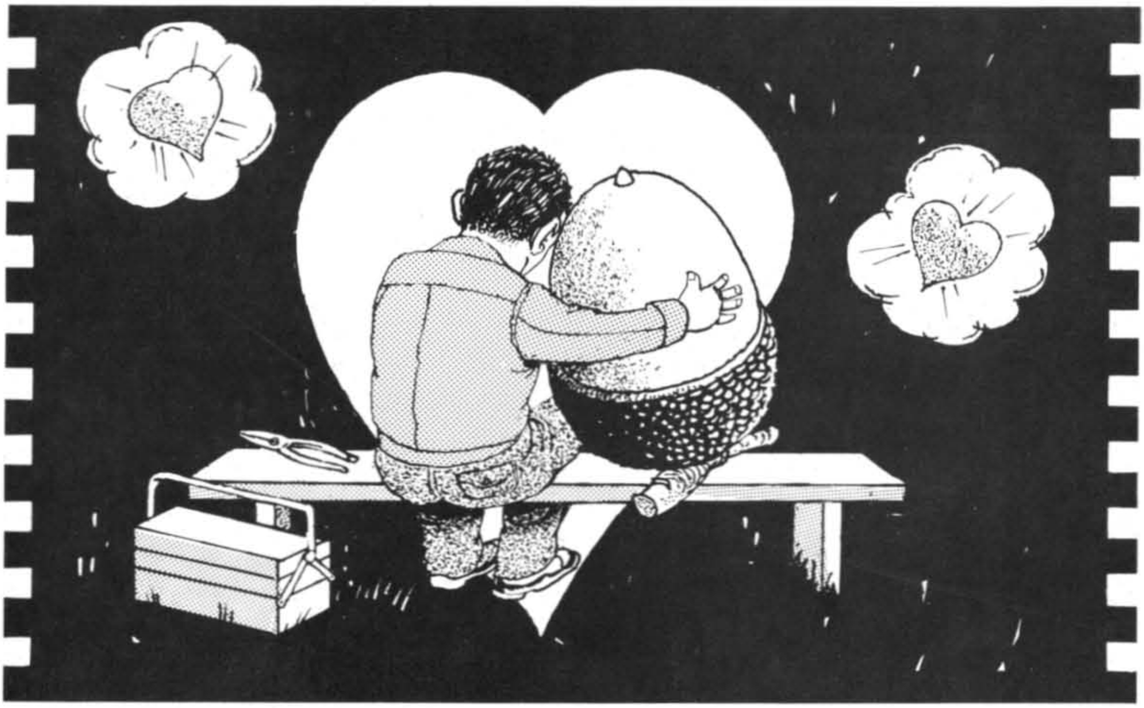

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Part 22

Interfacing the Atari Trak-Ball

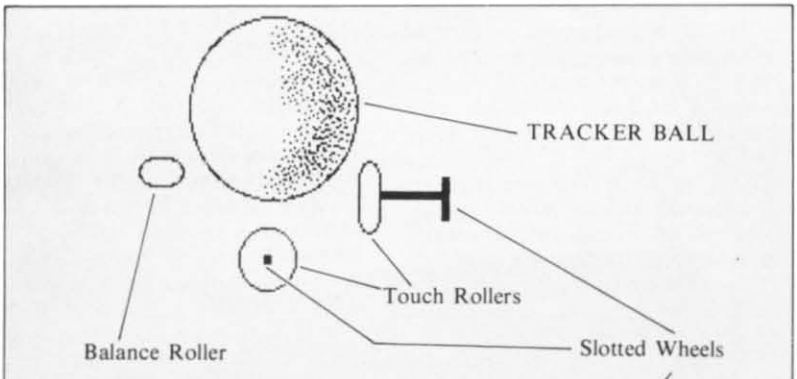


Figure 1: Operating principle of a tracker ball

By MIKE COOK

IT all started with a cry for help. A letter came across my desk from Paul Jenkins along with a small padded bag. Inside the bag was a pair of sad, sorry, cracked and greatly abused optical detectors. The letter explained how they had been extracted from an Atari Trak-ball and subjected to all manner of torture in an attempt to connect them to the BBC Micro.

Well, needless to say I had them painlessly destroyed and, as a founder member of the NSPCC (National Society for the Prevention of Cruelty to Components), I decided to work out how to interface a Trak-ball to prevent any future outrages.

This coincided with the price of the Trak-ball falling to a respectable £19.99, so I went out and bought one. The instructions said some very boring things and gave no clue as to what might be needed, so I attempted to dismantle it.

After much prising and prodding I discovered it was actually screwed together, the screws being cunningly concealed beneath the small rubber fee. Once open I could trace the power supply lines and also the fire button. The Trak-ball has two fire buttons, but unfortunately they are connected together inside the casing so they act as only one.

The device was developed from the tracker balls used for years, mainly in military establishments, because they provide a good "feel" – that is, the tactile feedback from them is good.

They were originally used to feedback missile tracking information into a computer, hence their name. When used for this purpose they are precision pieces of equipment costing as much as £800 each.

There are basically two types of tracker ball. The first is shown in Figure 1. A heavy ball is balanced on three or four rubber rollers. The ball is free to rotate and may be easily moved with the finger tips or rapidly spun.

Two of the rollers are mounted at right angles and pick up two axes of the ball's movement. These rollers are attached to a shaft, at the end of which is a slotted wheel, so movement of the ball is translated into movement of this wheel.

Two photo detectors are mounted on each wheel. They are slot-like devices

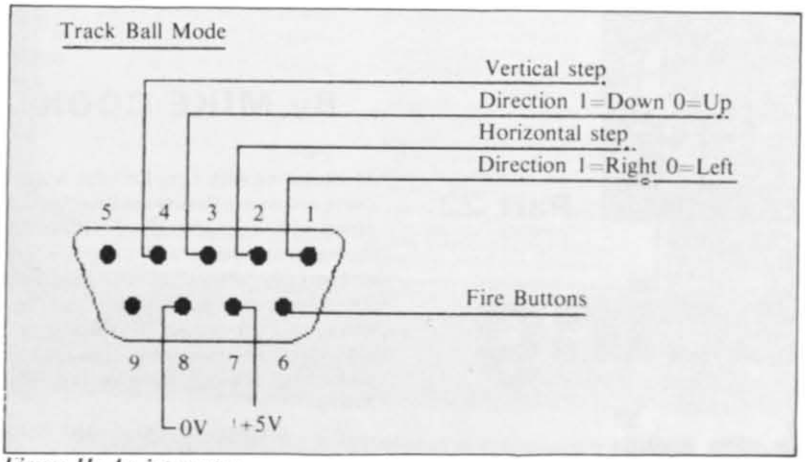


Figure II: An integrator

From Page 139

containing a source and detector. Spokes of the wheel will interrupt the light path and produce a pulse from each detector, the number of pulses being proportional to the movement of the ball.

But how do we detect which way round it goes? Consider the detectors shown in Figure I. If the wheel is turning clockwise detector B will be obscured slightly before detector A. The reverse will apply if the wheel is turning in the other direction.

We need some electronics to detect which edge is triggered first and produce a directional signal. Then we can take the straight output of one of the detectors to give us a step pulse. The Atari Trak-ball is of this first type.

The second variety uses a very similar mechanical arrangement, only the movement is transferred to potentiometers which can then be read with an analogue to digital converter. The problem with this type arises at the end of travel of the potentiometer.

There are two solutions. One is to let the rubber rollers slip, the other to give the potentiometers full 360 degree movement.

Well, I fired up the Atari Trak-ball with 5 volts and looked at the outputs. My findings are shown in Figure II.

As well as the fire buttons and supplies there are four signals giving direction and pulses for each plane of movement. The problem is how to convert these signals into a form that can be used by the BBC Micro.

It turns out there are many ways of achieving this, and it all depends upon what you want to use it for. This month we will look at one way and another couple of ways next month.

It has been said that my favourite programming language is Solder, so I first tackled a totally hardware approach.

The rational is that you would most likely want to use the Trak-ball in conjunction with existing software that makes use of the joysticks. These include games which require a good degree of control – not the violent side to side stuff – computer aided design packages and graphics-orientated environments such as that used by Apple Macintosh's mouse.

I say, I say, I say, what do you call a mouse on its back? Answer – a Tracker ball.

So I set to designing an interface which would turn the pulses from the Trak-ball into analogue signals suitable for feeding into the analogue input port. In this way existing software could be used without any form of modification or patch, the perfect solution.

What we need to do is take each pulse and add it to a total. Digitally this is easy, but in the analogue world we need to use an integrator, which is shown in Figure III. It consists simply of an operational amplifier with a capacitor as the feedback element.

Remember that an operational amplifier only amplifies the difference between its two inputs, and a capacitor will block direct current but let through changes. When we apply negative feedback, as in this case, the amplifier is trying to make the two inputs equal.

While this is the case the output will not change, but if a small voltage is placed on the negative input the output will go negative. This balances up the inputs again, but if the input is held then the output will have to be continuously changing, for it is only changes that can get through a capacitor.

The effect is that a constant voltage input produces a varying output. In mathematics if you integrate a constant you get a variable, and therefore this circuit is known as an integrator.

Note that the output will only ramp when there is a voltage at the input. When this is removed the output stops moving. Thus if we feed pulses into the integrator the output will ramp for a precise amount with each pulse and so will be at a level proportional to the number of pulses received. The speed or slope of the ramp depends upon the values of resistor and capacitor.

In our application we need to be able to ramp up as well as down, depending upon the direction of movement. This can be achieved using the Norton type of operational amplifier. As we have two separate movements to pick out we will need two integrators.

The full circuit of the Trak-ball interface is shown in Figure IV. This looks complicated at first sight but breaks down simply into two identical parts. Let's concentrate on one half and see how it works.

The step pulses are fed through capacitor C1 and split up. Some travel through R2 to the positive input and make the integrator ramp up. Some travel through R1 and D1 and make the amplifier ramp down. As R1 is smaller more "ramp down" signal is produced than "ramp up".

The direction signal is fed through an inverting amplifier to turn transistor T1

→

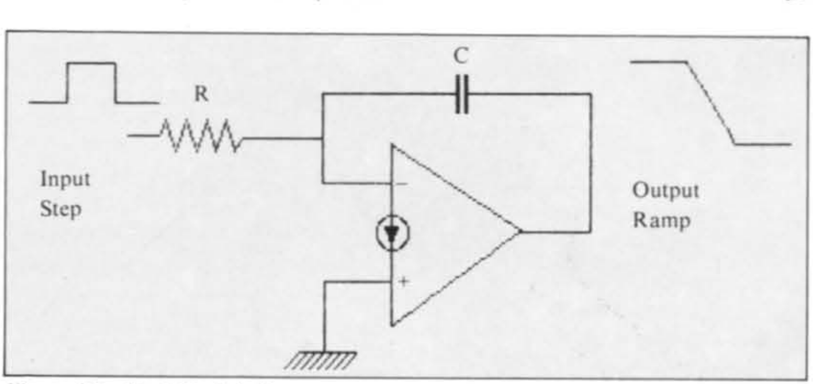
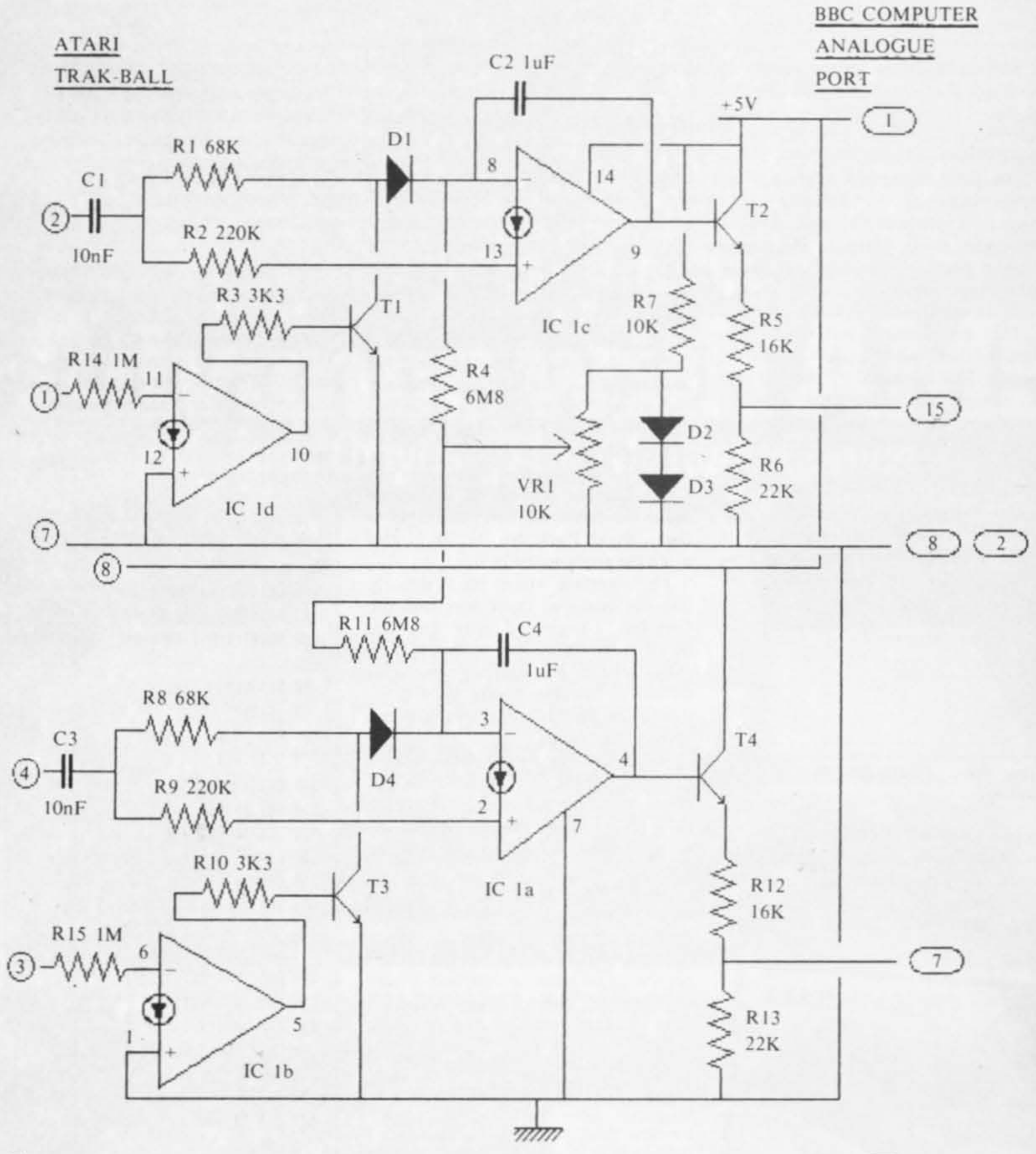


Figure III: Atari Trak-ball connector


ATARI
TRAK-BALL
BBC COMPUTER
ANALOGUE
PORT
C2 1uF
+5V
D1
R1 68K
C1
10nF
R2 220K
8
14
13
9
T2
R3 3K3
T1
IC 1c
R7
10K
R5
16K
R14 1M
11
12
10
IC 1d
R4
6M8
VR1
10K
D2
D3
R6
22K
15
7
8
2
R11 6M8
C4
1uF
R8 68K
C3
10nF
3
4
T4
D4
R9 220K
2
7
R10 3K3
T3
IC 1a
R12
16K
R15 1M
6
5
1
IC 1b
R13
22K
6
13
1
2
3
4

IC1 LM3900N
T1-T4 BC337 or similar D1-D4 1N4148

Figure IV: Circuit of Trak-ball interface

From Page 141

on and off. Think of T1 as a switch. If it is on then the ramp down signal will be shorted to earth and only ramp up signal will get to the integrator. Therefore this controls the direction of the integrator ramp.

The diode D1 stops the integrator capacitor C2 from discharging when T1 is on. The output from a Norton amplifier will not go to zero volts but sits slightly above this.

The transistor T2 acts as a buffer and removes this step as well as providing a low impedance input to the analogue input port. As the full range of the ramp is larger than is needed by the analogue input port, resistors R5 and R6 act as a potential divider to cut it down.

This arrangement will work quite well, but there will be a slight drift on the output. This is caused by the fact that the integrating operational amplifier needs a certain input current to maintain its output. This is compensated for by injecting a small amount of current exactly equal to that used via R4.

The voltage developed across two forward biased diodes D2 and D3 is tapped off by VR1, and if this is adjusted carefully any drift may be cancelled. This adjustment serves for both integrators. Ideally it should be separate for each but in practice it works perfectly well.

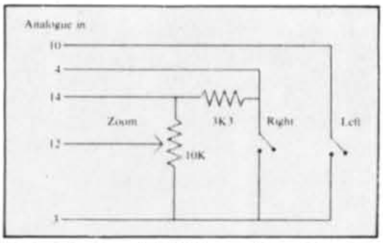


Figure V: Additions for Bitstik emulator

To make the Light Pen Draughtsman program from the March 1984 issue of The Micro User work with the Trak-ball, make these changes:

Delete lines 30, 1740, 1750
Delete lines 1990 to 2110 and 1810 to 1970
Change the following lines to read:

```
 1770 X%=XT
 1780 Y%=YT
 1990 YT=ADVAL(2) DIV 64
 2000 XT=(1024-(ADVAL(1) DIV 64))*1.2
 2150 PRINT SPC(9);"Trak-Ball DRAUGHT
SMAN"
```

Table I

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The Micro User can offer readers the Atari Trak-ball at the specially reduced price of £19.99.

To take advantage of this exceptional offer use the order form on Page 197.

The two inverting amplifiers on the direction signals are not strictly speaking needed. They are included to make the Trak-ball operate in the same "sense" as most games. As there are four amplifiers in a package it has not cost us anything except the price of two resistors. Finally the fire button is connected through.

I have laid out a printed circuit board for the interface and this, along with all the other components, is available as Body Build Pack No 19. It is also available ready-assembled.

The interface board plugs directly into the analogue input port with the Trak-ball plugging directly into the board.

Construction should present no difficulty. Just make sure the diodes, transistors and ICs are mounted the correct way round.

When completed move the switch on the back of the Trak-ball to the TB position and run the program in Listing I. This will allow you to change the length of each line by use of the Trak-ball.

Set the length to about half way and adjust VR1 until one line is slowly drifting up and the other is slowly drifting down. On my prototype I could get the adjustment so fine that it took over 10 minutes to drift across the full scale. In practice this will be no problem at all.

As I said, the circuit is designed to operate in the conventional way. However for those using Acorn's Bitstick this is reversed. To accommodate this operate the Trak-ball from the back by turning it around.

To replace a Bitstik you will also need to add another potentiometer and two more switches as shown in Figure V.

Connecting holes have been left on the printed circuit layout to allow you to connect up the additional circuits. I am told that Acorn have a patch to allow their new Elite game to run with the Bitstik so you should be able to use it with the Trak-ball.

If you want a free drawing package, I wrote one in the March 1984 issue of *The Micro User*, page 141. It was designed to be used with a light pen. However a few simple additions should allow it to be used with the Trak-ball. First load the program in and then follow the instructions in Table I.

The Trak-ball is best used in games requiring fine adjustment. If you want to have a coarse movement then you can change the values of C2 and C4 to 0.1 uF or smaller. However it will then act rather like a joystick that is not self centring.

For games requiring rapid changes in direction with a self-centring action the Trak-ball can be operated in the JS mode by changing a switch on the back. This makes the signals out behave totally differently and that will require another circuit and another month.

- *Body Build Pack 19 costs £17.95, and there is a ready-made version for £23.95. See order form on Page 197.*

```
   10 MODE 4
   20 PRINT TAB(0,4)"THE BEEB BODY BU
ILD COURSE"
   30 PRINT"MICRO USER JAN 1985"
   40 PRINT"By Mike Cook"
   50 PRINT"ATARI TRAK-BALL INTERFACE
 TEST"
   60 DIM OX%(2),Y%(2)
   70 A$="*"
   80 GCOL 3,1
   90 OX%(1)=0
  100 OX%(2)=0
  110 Y%(1)=600
  120 Y%(2)=500
  130 REPEAT
  140 PRINT TAB(0,11)
  150 FOR C%=1 TO 2
  160 A%=ADVAL(C%) DIV 64
  170 MOVE 0,Y%(C%)
  180 DRAW OX%(C%),Y%(C%)
  190 MOVE 0,Y%(C%)
  200 DRAW A%,Y%(C%)
  210 PRINT"CHANNEL ";C%;" ";A%;SPC(6)
  220 PRINT
  230 PRINT
  240 OX%(C%)=A%
  250  NEXT
  260 PRINT "FIRE BUTTON ";
  270 B%=ADVAL(0) AND 1
  280 IF B%=0 THEN PRINT "UP  " ELSE
PRINT "DOWN"
  290 *FX19
  300 *FX19
  310 UNTIL FALSE
```

Listing I

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by

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If the planet you land on isn't owned, you'll have the chance to purchase and develop it, and, of course, charge visitors rent.

However, if it is already owned, you'll have to pay rent to the landlord.

The planets are divided into groups and as soon as you own a complete group you can start to develop a colony by building Space Domes. The larger the colony, the more rent you will receive from your casual visitors.

Alas it is not quite as simple as that . . . it never is.

You will be playing against people who are equally as ambitious as yourself and they are certainly not going to make life easy.

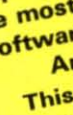
In addition to the obligatory landing dues for touching down on someone else's planet, you have to pay taxes, take chances and run the ever present risk of imprisonment.

On the other hand there is always the possibility of winning the Jupiter Lottery, and there's a generous annual salary every time you pass Earth.

Whatever the odds it's your job to turn them in your favour and see all your opponents bankrupt. (It's a hard life in the outer galaxy . . .)

Your playing surface is the screen, with individual squares representing the various locations throughout the galaxy. There are no dice to be shaken and no fiddly objects to move around as in other, earthbound variants of the game. Your micro will take care of all that and will also prevent anyone "accidentally" miscounting either the numbers on the dice or the number of squares to move – it's met that sort of player before.

And that's all there is to it. The universe is there for the taking – may the force be with you!



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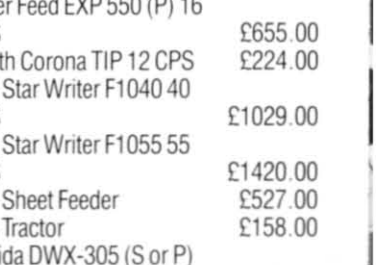

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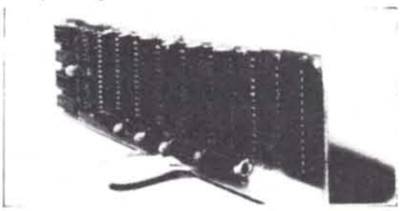

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In Part V of our in-depth examination of the extra instruction set available in the second processor, PETER JOHNSON looks into . . .

The Ins and Outs of info swapping

PREVIOUSLY we have looked at the 65C02 chip used in Acorn 6502 second processors for the BBC Micro. Now I want to view the system in a more general sense, discussing the techniques for running programs in the IO processor and the second processor and how information may be passed between them.

A common source of confusion when writing programs for the Tube is what is meant by Tube compatible. In particular people seem to think that any accessing of the memory, such as using Basic's ! and ? operators, will render a program incompatible. This is not true if the memory being accessed is part of "language" rather than "operating system" workspace.

In summary, zero-page from &00 to &8F and locations &400 to &7FF are language space, and this may be peeked and poked with impunity (though not necessarily with Acorn's approval) on either side of the Tube.

For example, if you have a machine code program that returns a result in Basic's static variable A% by poking locations &404-407, it will work with or without the Tube, providing the program is running in the same processor as Basic.

"Ha," you say, "if that's true why doesn't my Computer Concepts graphics ROM return correct results in the static variables when the Tube is on?" The answer is that the graphics ROM is a service ROM.

Service code always lives and executes in the IO processor, whether a Tube is connected or not. This means that writing to &404-&407 from service code when a Tube is connected does not write to Basic's variable A%, but to the Tube code which is located in pages &400 to &700 of the IO processor when a second processor is fitted.

The rule to follow if you are writing service ROMs is not to access language workspace if you want your code to work with the Tube. Unfortunately most toolkit ROMs ignore this rule.

Acorn provides numerous MOS calls which guarantee that the IO processor memory is accessed, for example the OSBYTEs to read and write the three pages FRED, SHEILA and JIM. There are also the OSWORDs 5 and 6 for peeking and poking the IO processor respectively.

These calls should be used whenever possible, but usually carry a speed penalty with them. Faster ways of accessing the IO processor from the second processor (and vice versa) are discussed later.

It is informative to look at the hardware that comprises the Tube before we look at the software protocols.

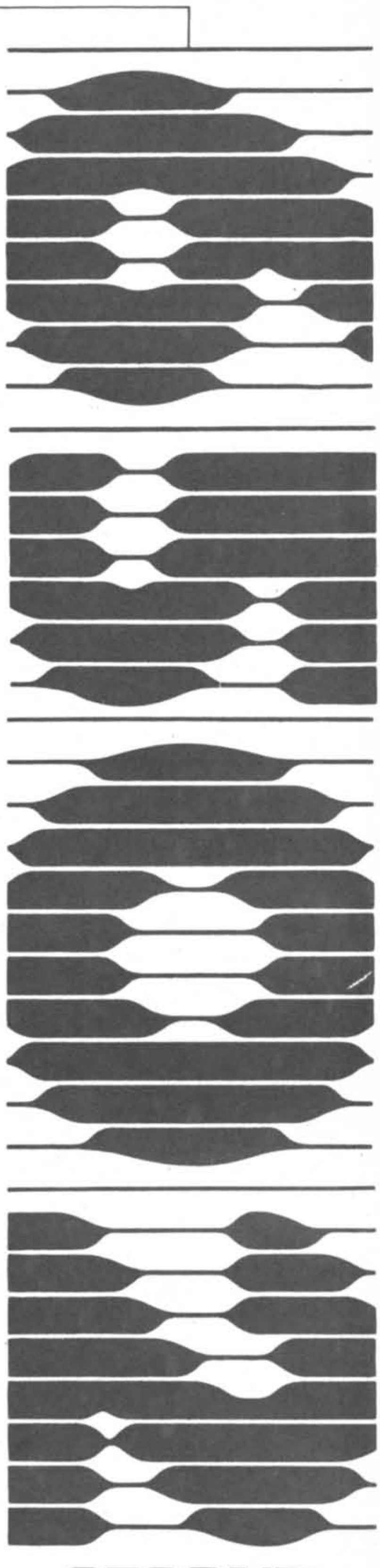
The Tube chip, which is common to all types of second processor, has eight registers – four pairs of bi-directional data/status pairs. Figure I shows how the registers are mapped into the memory of the BBC Micro and the 6502 second processor.

IO processor address	*Register name*	*Second processor address*
&FEE0	**Status register 1**	**&FEF8**
&FEE1	**Data register 1**	**&FEF9**
&FEE2	**Status register 2**	**&FEFA**
&FEE3	**Data register 2**	**&FEFB**
&FEE4	**Status register 3**	**&FEFC**
&FEE5	***Data register 3**	**&FEFD**
&FEE6	**Status register 4**	**&FEFE**
&FEE7	***Data register 4**	**&FEFF**

Figure I

Accessing registers marked * in the IO processor will cause an interrupt to

→



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occur in the second processor.

All the data registers are birectional, so that a byte written to, say, address &FEE3 in the IO processor may be read at address &FEFB in the second processor. Similarly, writing to address &FEF9 in the second processor will transfer a byte to the latch at &FEE1 in the IO processor.

Data register 1 is actually a 10 byte FIFO (first-in first-out) buffer in the second processor to IO processor direction. This enables the longest VDU sequence (VDU 23) to be sent to the IO processor without holding up processing on the second processor.

The four status registers each contain two flags in their two most significant bits. Bit 7 is "data ready" for reading, and bit 6 is "space available" for writing. Synchronised data transfers may be achieved by polling the status registers.

The software protocols that Acorn use are complex. But briefly register 1 is used to send bytes to OSWRCH, register 2 is used to send other OS calls, such as OSBYTE, OSRDCH, to the IO processor and registers 3 and 4 are used to control block moves of data under interrupts used by filing systems's loading and saving files.

A high level facility exists to access IO processor memory from the Tube and involves the use of OSWORD calls 5 and 6. 5 is for peek and 6 is for poke.

On entry XY points to a five byte parameter block. The first 4 bytes are the address in the IO processor to access and the fifth byte is the value read or the value to be written.

Program I shows how the OSWORDs may be used to invert the value of every byte on the screen (which is in the IO processor of course) from the Tube.

For a Mode 0 screen this takes 4.06s when executed from the IO processor, and a massive 8.76s when executed across the Tube. If the routine at invertByte is replaced by the code:

```
ldy 0
lda (parBlk),Y
eor &FF
sta (parBlk),Y
rts
```

the program only takes 0.38s in the IO processor – ten times faster than using OSWORD.

The program can be further optimised by using Y as the low-byte of the address and putting the code in line: this takes 0.20 seconds for a Mode 0 screen. CLG takes 0.60 seconds. I shall look at ways in which this speed may be improved later.

When transferring data in the other direction – that is using a program running in the IO processor – you must use the calls that are provided for filing systems.

These calls may only be used when the Tube is active as opposed to the OSWORDs which are available at all times. The routine to call is at location &406 in the IO processor.

The task performed depends on the value in A. XY always points to a four byte parameter block holding the address of the first byte to be accessed (in the second processor). Possible values of A are:

A=&00	**Start a second processor read**
A=&01	**Start a second processor write**
A=&04	**Run a program at address in parameter block**
A=&C0+n	**Claim the Tube for filing system n**
A=&80+n	**Release the Tube from filing system n**

The advantage of these calls is that once the read/write has been set up repeated access can be made simply by accessing the Tube data register at address &FEE5.

However you do have to introduce a small delay between sending bytes. This is in order to give the code in the second processor time to process the incoming or outgoing data.

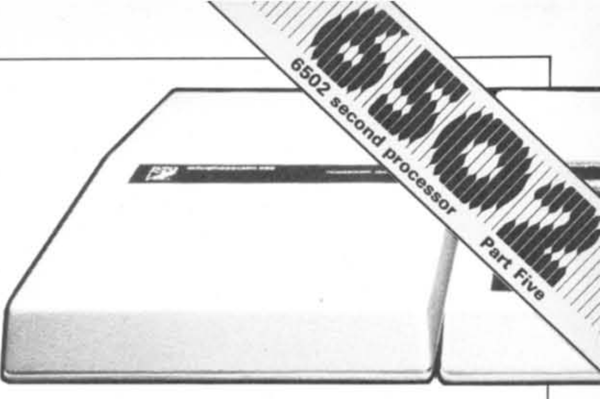
The calls with A=&C0+n and A=&80+n must be given before you start and after you've finished using the

```
 1000 REM  Program to invert the scre
en memory
 1010 REM  Uses OSWORD 5 and 6 for Tu
be compability
 1020 osword=&FFF1
 1030 osbyte=&FFF4
 1040 parBlk=&70
 1050 DIM code 100
 1060 FOR pass=0 TO 2 STEP 2
 1070 P%=code
 1080 [ opt pass
 1090 .invertScreen
 1100   lda #&87       Get the screen m
ode in Y
 1110   jsr osbyte
 1120   tya            Find the lowest
address of that mode
 1130   tax
 1140   lda #&85
 1150   jsr osbyte
 1160   stx parBlk   Set two LSBs of
address to XY
 1170   sty parBlk+1
 1180 .loop
 1190   jsr invertByte  Invert the by
te pointed to by parBlk
 1200   inc parBlk   Next byte
 1210   bne loop
 1220   inc parBlk+1
 1230   bpl loop
 1240   rts          Return at &8000
 1250
 1260 .invertByte
 1270   lda #5       Get the byte
 1280   jsr doOsword
 1290   lda parBlk+4
 1300   eor #&FF     Invert it
 1310   sta parBlk+4
 1320   lda #6       Save it again
 1330 .doOsword
 1340   ldx #parBlk MOD &100
 1350   ldy #parBlk DIV &100
 1360   jmp osword
 1370 ]
 1380 NEXT
```

Program I

```
 1000 REM  Program to try out Tube tr
ansfers
 1010 DIM code 200
 1020 parBlk=&70
 1030 tubeCall=&406
 1040 ioAddress=&2000
 1050 oswrch=&FFEE
 1060 osbyte=&FFF4
 1070 tubeCall=&406
 1080 data=&FEE5
 1090 myId=&08
 1100 FOR pass=4 TO 6 STEP 2
 1110 O%=code : P%=ioAddress
 1120 [ opt pass
 1130 .test
 1140
 1150 .claimLoop
 1160   lda #&C0+myId       Claim tube
 for me
 1170   jsr tubeCall
 1180   bcc claimLoop
 1190
 1200   lda #1              Init write
 from HIMEM to &8000
 1210   jsr initXfer
 1220
 1230   ldy #0
 1240   jsr del             Small dela
y for Tube
 1250 .loop1
 1260   lda (parBlk),Y      Get byte t
```

Program II



Tube. Several values of n seem to be in use, varying between filing systems. In order to avoid conflicts, I recommend that you use n=&08.

When claiming the Tube you must use a loop, such as lines 1150-1180 in Program II, to wait for the Tube to become available. No such loop is required when releasing the Tube.

Program II illustrates the use of these calls. It reads every byte on the screen, inverts them and saves them in the second processor. It then reads the bytes back, storing them on the screen.

The last line saves the object code with the correct high-order addresses, for example it loads and executes in the IO processor. To see it in action, type:

***IO_TUBE**

In Mode 0 this takes 0.59 seconds, not counting the load time. This is just three times slower than the fastest direct method, so transferring data using a program in the IO processor is obviously much quicker than doing it the other way round.

Note that the small delays introduced by "jsr del" seems to be sufficient when using the 6502 second processor. You may need to increase (or decrease) these when using, say, a Z-80 second processor.

Sometimes we want to make a program start in the IO processor, even when a Tube is attached. The easiest way to do this is set the load and execution addresses of the program and *RUN it, just like the 10_TUBE above.

However, this is very inconvenient if the program is to be called more than once, especially when using tape. A better solution is to load the program just once and then "activate" it when required.

Starting a program from the second processor is a problem because most likely we want to call a routine to start the program in the IO processor and then have it return immediately so that we can start "talking" to it across the Tube.

Most OS routines that go across the Tube will not achieve this, as they wait for the IO processor to finish the task before returning.

There is one call however, an OSBYTE, which returns straight away, without waiting for a reply. This is OSBYTE &9D, the so-called fast Tube OSBPUT. This gives the parameters in X and Y to the Tube, then returns without waiting for a result.

This is the method for setting up two cooperating processes:

*RUN a program in the IO processor. This program sets up BYTEV so that OSBYTEs are channelled through our own routine – which is also part of the program loaded in.

The new OSBYTE routine looks for calls with A=&9D. Any others get passed on to the old OSBYTE routine. Calls with A=&9D interact with the Tube registers to talk to the program on the other side.

Once the IO processor set-up program has been executed, the program in the second processor simply calls OSBYTE will A=&9D, then talks directly to the Tube. Some protocol has to be arranged so that both programs know when to return.

To illustrate this technique I present a program that reads 256 bytes (one 6502 page) of data from a paged ROM in the IO processor into the second processor. To start the transfer, an OSBYTE call with:

A = &9D
X = start page in the IO processor
Y = paged ROM number

is made. To read the first page of ROM number 15, for example,

A = &9D (our clever OSBYTE)
X = &80 (address &8000)
Y = &0F (ROM number 15)

would be used. To perform the transfer, the register pair 2 is used. The program

```
o send
 1270   eor #&FF
 1280   sta data          Send the d
ata
 1290   jsr del           Small dela
y for Tube
 1300   iny               Next byte
 1310   bne loop1
 1320   inc parBlk+1      Inc high b
yte
 1330   bpl loop1         End at &80
00
 1340
 1350   lda #0            Start to r
ead it back
 1360   jsr initXfer
 1370
 1380   ldy #0
 1390   jsr del
 1400 .loop3
 1410   lda data          Get the by
te
 1420   sta (parBlk),Y    Save it
 1430   jsr del           Small dela
y for Tube
 1440   iny               Next byte
 1450   bne loop3
 1460   inc parBlk+1
 1470   bpl loop3         Stop at &8
000
 1480   lda #&80+myId     Release tu
```

```
be
 1490   jsr tubeCall
 1500 .del
 1510  rts
 1520
 1530 .initXfer
 1540   pha                    Save reaso
n code
 1550   lda #&84               Get IO pro
cessor HIMEM
 1560   jsr osbyte
 1570   stx parBlk             Set addres
s to top of screen
 1580   sty parBlk+1
 1590   stx parBlk+2           Zero upper
 bytes
 1600   stx parBlk+3           (HIMEM alw
ays a page boundary => X=0)
 1610   pla                    Get reason
 code
 1620   ldx #parBlk MOD &100   XY poi
nts to address
 1630   ldy #parBlk DIV &100
 1640   jmp tubeCall
 1650 ]
 1660 NEXT
 1670 OSCLI"SAVE IO_TUBE "+STR$~code+
" "+STR$~O%+" "+STR$~(&FFFF0000+test)
+" "+STR$~(&FFFF0000+test)
```

⟶

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required on the Tube side is listed in Program III.

The program is very simple. First the OSBYTE call is made to start the transfer process in the IO processor. The values of X and Y are just examples, and can be any other meaningful numbers. If X is outside of the range &80-&BF (is not in paged ROM space) the value in Y does not matter.

The OSBYTE will return straight away, and the program in the IO processor will start to send 256 bytes from the required address and ROM number. The main loop simply waits for data to become ready in the data register and then stores it in the buffer. This is 256 bytes of memory that follow the program (though they could lie anywhere).

After the page has been transferred

```
 1000 REM Code required in 2nd Proc
 1010 REM to Xfer 256 bytes from IO p
roc
 1020 osbyte=&FFF4
 1030 data=&FEFB   :REM Address of da
ta reg.
 1040 status=&FEFA :REM Address of st
atus reg.
 1050 DIM code 350
 1060 FOR pass=0 TO 2 STEP 2
 1070 P%=code
 1080 [ opt pass
 1090   lda #&9D       OSBYTE &9D init
s the xfer
 1100   ldx #&80       Transfer from &
8000 - &80FF
 1110   ldy #&0F       Use Paged ROM 1
5
 1120   jsr osbyte     Start the trans
fer
 1130
 1140   ldx #0         Now read 256 by
tes from the Tube
 1150 .TubeLoop
 1160   bit status     Is there a byte
 ready?
 1170   bpl TubeLoop   No
 1180   lda data       Get the byte
 1190   sta buffer,X   Store it
 1200   inx            Next byte
 1210   bne TubeLoop
 1220   rts            Finished
 1230
 1240 .buffer
 1250   EQUS STRING$(255," ")       25
6 byte buffer
 1260   EQUB 0
 1270 ]
 1280 NEXT
 1290 OSCLI "SAVE XFERT "+STR$~code+"
 "+STR$~P%
```

Program III

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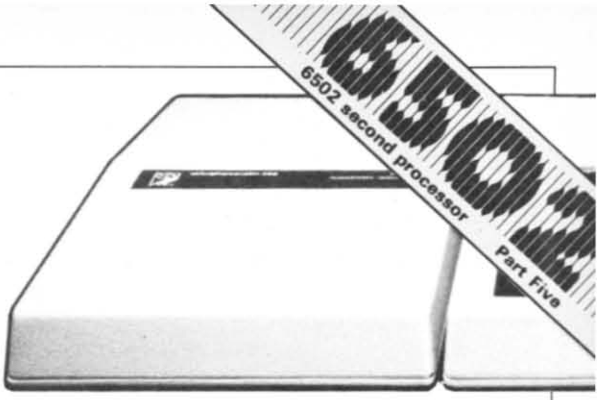


the program returns, as it is assumed it would be called as a subroutine of some other program.

The cooperating program that resides in the IO processor is listed next. It is in two parts, a very short part which simply sends all OSBYTE calls to our routine, and the routine itself.

The set-up routine modifies the code in the main routine by storing the old OSBYTE address in it. I defend this rather unpleasant practice by saying that the Tube code in the second processor is full of self-modifying code.

> **A system could be set up for copying sprites from the second processor to the screen – resulting in megagames with high speed graphics**

The main program checks that the OSBYTE received is one of ours, that is A=&9D. If not, the default OSBYTE in the MOS ROM is called immediately. If A does hold &9D then X will be the page address and Y the ROM number.

Note that I don't bother to save the old ROM id. before changing it – the selected ROM has no relevance when the Tube is active.

The main loop is very similar to the one in the second processor program but instead of waiting for a byte to become available, it waits for a space to appear in the data register so that a byte can be sent.

To use the program, the IO processor part must be executed using, for example:

***RUN XFERI**

Next the second processor part can be used using:

***RUN XFERT**

or by loading XFERT and calling it from machine code. This will cause the 256 bytes from address &8000-&80FF in ROM 15 to be copied across into the buffer in the second processor.

An interest variation on this theme is to transfer bytes in the opposite direction – that is write the IO processor memory. With slightly modified protocols a system could be set up for copying sprite shapes at high speed from the second processor onto the screen.

This could be a way of having "megagames" which use the large memory of the second processor and also have high speed graphics.

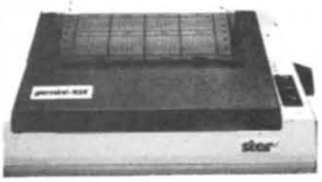
If you think this is impractical, consider that (rumour has it) Acornsoft has a version of Frogger which runs quicker on the Tube than without it.

There are obviously many more ways of using the high-speed data transfer capability of the Tube. Some of these may be covered in later articles.

```
 1000 REM Code required in IO  Proc
 1010 REM to Xfer 256 bytes from IO p
roc across the Tube
 1020
 1030 ptr=&70           :REM  Pointer t
o byte to be copied
 1040 romId=&F4         :REM  Copy of c
urrent ROM number
 1050 bytev=&20A        :REM  Holds the
 address of OSBYTE
 1060 romLatch=&FE30  :REM  Hardware
latch that selects ROM
 1070 data=&FEE3        :REM  Address o
f data reg.
 1080 status=&FEE2      :REM  Address o
f status reg.
 1090
 1100 DIM code 100    : org=&FFFF2000
 1110 FOR pass=4 TO 6 STEP 2
 1120 P%=org : O%=code
 1130
 1140 [ opt pass
 1150 .setup
 1160   lda bytev         Save the old
osbyte vector
 1170   sta oldByte+1
 1180   lda bytev+1
 1190   sta oldByte+2
 1200   lda #myByte MOD &100   Now re
place it with my address
 1210   sta bytev
 1220   lda #myByte DIV &100
 1230   sta bytev+1
 1240   rts               That's all!
 1250
 1260 .myByte
 1270   cmp #&9D          Only intercep
t OSBYTEs &9D
 1280   beq gotOne
 1290 .oldByte
 1300   jmp &0000         Filled in by
.setup
 1310 .gotOne
 1320   sty romId         Set desired R
OM
 1330   sty romLatch
 1340   stx ptr+1         Set address o
f the desired page
 1350   lda #0            Zero the low
byte
 1360   sta ptr
 1370   tay               Do 256 bytes
 1380 .IOloop
 1390   bit status        Ready to take
 a byte?
 1400   bvc IOloop        No
 1410   lda (ptr),Y       Get the byte
 1420   sta data          and send it
 1430   iny               Next byte
 1440   bne IOloop
 1450   lda #&9D          OSBYTE must a
lways preserve A
 1460   rts
 1470 ]
 1480 NEXT
 1490 OSCLI "SAVE XFERI "+STR$~code+"
 "+STR$~O%+" "+STR$~org+" "+STR$~org
```

Program IV

star *ATTRACTIONS*



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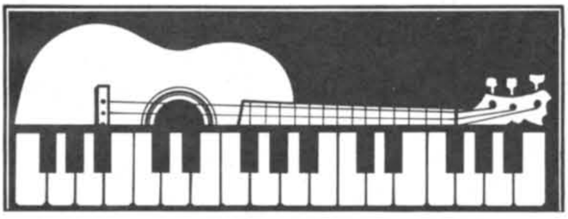

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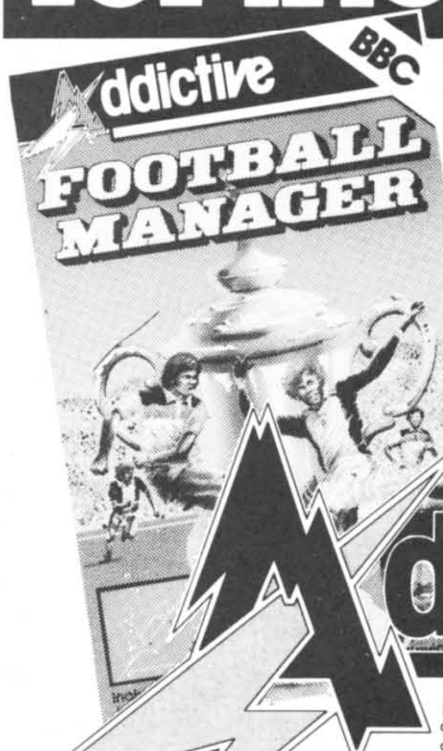

Football Manager

Designed by Kevin Toms

This outstanding game of skill and strategy is now widely available and you can join the many thousands of satisfied customers who have purchased the game. This is no five minute wonder – you will be playing this game for hours over many weeks (we know – our customers tell us!).

Kevin Toms

Some of the features of the game:–

- ★ Matches in 3D graphics ★ Transfer market
- ★ Promotion and relegation ★ F.A. Cup matches
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Addictive

* Home Computing Weekly BBC Charts 4 Weeks at No. 1.

Programmers
We want your software. Send us a sample. If accepted, we will supply royalties plus generous free advice from Kevin himself!

Football Manager from Addictive Games should send soccer fans 'over the moon' but the game scores highly with non-enthusiasts, too.

As manager of your favourite team, it is your job to decide each week who will play in the next match on the fixture list, whether to buy or sell players, and whether to borrow money or repay a loan according to the club's financial fortunes.

Whichever team you choose, you start in division four. By the end of 22 League matches, you hope to be promoted to division one and possibly win the FA Cup as well. If the team closest to your heart is not available, the game allows you to customise the data file to include your own team and players.

Among the many other options offered are seven skill levels ranging from beginner to genius. If you start as a beginner and do well, your rating is adjusted automatically at the end of the season. The most crucial decision affecting your team's performance, however, involves the selection of players and it is based on the attributes of the two opposing teams. Their energy, morale, defence and attacking strength are valued on a scale of points, and players are chosen according to positional skills and energy they can bring to the team. True to life, players' energy is depleted after a game and restored after a rest.

Having settled all the details, you can then sit back and watch the game – a short, animated sequence showing the 'highlights'. Scores, injuries and new league placings are all displayed at the end.

The combination of graphic action and informed decision-making distinguishes Football Manager from many other strategy games and the scope and careful presentation of the program make it entertaining and absorbing.

(Acorn Programs – August/September 1984)

DIVISION ONE

As Automata have also proved, Addictive Games has shown that it is possible to write excellent programs in Basic – Football Manager started life as a ZX81 program ages ago and is still going strong.

The latest version is the most impressive yet; running as it does on the BBC B, the action is fast and the animated football sequences most impressive. On the BBC the little men have evolved from match-sticks to Subbuteo figures. Another addition is the provision of a fixture list which you can consult.

Apart from that, it only remains to summarise the game for those people who don't know it. As a football manager you choose the teams buying the players, deciding who to play, keeping morale high and basically living out your footballing fantasies as you try to move your team up the divisions.

Matches are decided according to a vast number of factors, only one of which is luck, and you get to see the highlights of each game.

Quite honestly, John, I think you're going to be over the moon about this one unless you're strictly TT on footballing matters in which case you'll probably be sick as a parrot, squire.

(Popular Computing Weekly).

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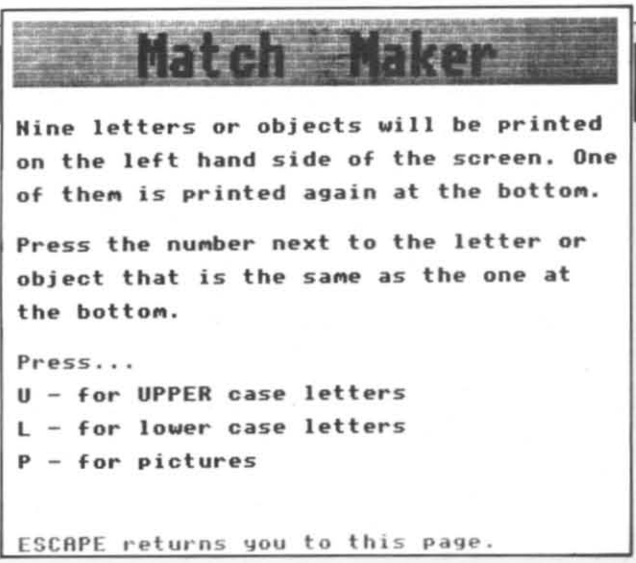
Match Maker listing



Match Maker

Nine letters or objects will be printed on the left hand side of the screen. One of them is printed again at the bottom.

Press the number next to the letter or object that is the same as the one at the bottom.

Press...

U - for UPPER case letters

L - for lower case letters

P - for pictures

ESCAPE returns you to this page.

From Page 81

```
   10 REM #### Match  Maker ####
   20 REM ** By R.A.Waddilove **
   30 ON ERROR MODE 6:CLEAR:IF ERR<>1
7 REPORT:PRINT" at line ";ERL:END
   40 IF PAGE>&E00 PROCmove:END
   50 PROCassemble:CLEAR
   60 PROCinitialise
   70 MODE 1:VDU 23,1,0;0;0;0;
   80 PROCinstructions
   90 MODE 2:VDU 23,1,0;0;0;0;
  100 REPEAT
  110 PROCscreen
  120 PROCtune
  130 REPEAT
  140 PROCquestion
  150 PROCman
  160 UNTIL Y%=672
  170 COLOUR 1:PRINT TAB(17,3);CHR$25
5;TAB(16,2);CHR$255
  180 PROCtune
  190 UNTIL FALSE
  200 END
  210 DEF PROCmove
  220 SOUND 1,-15,0,20
  230 *KEY0 "*TAPE|MD%=PAGE-&E00:FORI
%=PAGE TO TOP STEP4:!(I%-D%)=!I%:NEXT
:?(TOP-D%)=255:PAGE=&E00|L|MOLD|MRUN|
M"
  240 CLS:PRINT''"Not enough memory..
."''''"Press function key 0"''"(f0) to
 relocate."'':*FX21,0
  250 ENDPROC
  260 DEF PROCpics
  270 VDU 23,224,102,36,126,219,231,1
26,36,102
  280 VDU 23,225,0,0,0,36,0,0,0,0
  290 VDU 23,226,129,126,129,129,129,
129,129,126
  300 VDU 23,227,0,0,0,36,0,60,0,0
  310 VDU 23,228,102,36,126,153,153,2
31,126,36
  320 VDU 23,229,0,0,0,0,68,0,0,0
  330 VDU 23,230,132,132,134,133,133,
134,132,120
  340 VDU 23,231,0,120,120,120,120,12
0,120,0
  350 VDU 23,232,0,0,128,196,191,227,
0,0
  360 VDU 23,233,0,0,0,0,64,28,0,0
  370 VDU 23,234,8,106,255,223,189,22
3,126,60
  380 VDU 23,235,0,0,0,32,66,32,0,0
  390 VDU 23,236,24,60,24,0,0,129,0,1
02
  400 VDU 23,237,0,0,0,255,189,24,36,
0
  410 VDU 23,238,0,0,60,60,60,129,255
,0
  420 VDU 23,239,0,0,0,0,0,60,0,0
  430 VDU 23,240,28,127,0,0,0,0,0,0
  440 VDU 23,241,0,0,62,46,126,30,60,
8
  450 VDU 23,242,126,255,219,102,0,0,
0,195
  460 VDU 23,243,0,0,36,24,24,24,24,6
0
  470 VDU 23,244,129,126,153,189,231,
126,66,36
  480 VDU 23,245,0,0,102,66,0,0,0,0
  490 VDU 23,246,0,0,0,153,255,159,14
9,247
  500 VDU 23,247,60,126,255,0,0,0,8,8
  510 ENDPROC
  520 DEF PROCchars
  530 VDU 23,243,0,16,56,56,16,0,0,0:
REM girl
  540 VDU 23,244,0,0,0,0,0,40,40,108
  550 VDU 23,245,0,0,0,0,0,124,170,18
6
  560 VDU 23,246,40,124,108,214,254,0
,0,0
  570 VDU 23,248,129,255,129,129,129,
129,129,129:REM ladder
  580 VDU 23,249,255,129,66,36,24,255
,0,0:REM stage
  590 VDU 23,250,24,60,60,24,0,0,0,0:
REM man climbing
  600 VDU 23,251,0,128,128,128,255,61
,61,61
  610 VDU 23,252,60,102,102,102,230,6
,6,7
  620 VDU 23,253,0,1,1,1,255,188,188,
188
  630 VDU 23,254,60,102,102,102,103,9
6,96,224
  640 VDU 23,255,0,108,254,254,254,12
4,56,16:REM heart
  650 ENDPROC
  660 DEF PROCtitle
  670 VDU 23,224,0,0,0,138,218,170,13
8,138,23,225,0,0,0,238,138,140,138,23
4,23,226,0,0,0,224,160,160,160,224
  680 VDU 23,227,0,0,0,174,168,174,16
2,238,23,228,0,0,0,238,138,204,138,23
4
  690 VDU 23,229,0,0,0,232,136,200,13
6,238,23,230,0,0,0,238,136,200,136,23
8,23,231,0,0,0,238,74,76,74,74,23,232
,0,0,0,233,173,171,169,233
  700 ENDPROC
  710 DEF PROCinitialise
  720 *FX11,0
  730 *FX4,1
  740 *FX16,0
  750 *FX9,20
  760 *FX10,80
  770 *KEY10 "OLD|MRUN|M"
  780 DIM note%(8),colour%(24)
  790 FOR I%=0 TO 8
  800 READ note%(I%)
  810 NEXT
  820 FOR I%=1 TO 24
  830 READ colour%(I%)
  840 NEXT
  850 ENDPROC
  860 DATA 116,112,104,96,88,84,76,68
,64
  870 DATA 1,10, 2,3, 4,10, 6,3, 4,1,
 2,3, 1,6, 5,2, 4,6, 2,1, 4,3, 4,1
  880 DEF PROCtune
  890 FOR I%=0 TO 5
  900 FOR J%=0 TO 3
  910 SOUND 1,-15,20,4:SOUND 1,-15,no
te%(I%+J%),4
  920 NEXT
  930 NEXT
  940 SOUND 1,-15,20,5:SOUND 1,-15,68
,10
  950 FOR I%=8 TO 1 STEP -1
```

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From Page 159

```
  960 SOUND 1,-15,note%(I%),4
  970 NEXT
  980 SOUND 1,-15,116,40
  990 ENDPROC
 1000 DEF PROCinstructions
 1010 VDU 19,1,4;0;19,3,6;0;
 1020 COLOUR 129:PRINT STRING$(160,"
")
 1030 GCOL 0,2:MOVE 260,900:H%=3:W%=2
:BIG$="Match  Maker":CALL B%,BIG$
 1040 COLOUR 3:COLOUR 128:PRINT TAB(0
,6);"Nine letters or objects will be
printed"''"on the left hand side of t
he screen. One"'"of them is printed a
gain at the bottom."
 1050 PRINT''"Press the number next t
o the letter or"''"object that is the
 same as the one at"''"the bottom."
 1060 COLOUR 2:PRINT''"Press...":COLO
UR 3:PRINT'"U - for UPPER case letter
s"''"L - for lower case letters"''"P
 - for pictures"''''CHR$17;CHR$1;"ESC
APE returns you to this page.";TAB(0,
29);
 1070 capitals=FALSE:lowercase=FALSE:
pictures=FALSE
 1080 VDU 7:*FX21,0
 1090 REPEAT key$=CHR$(GET AND &DF)
 1100 IF key$="U" capitals=TRUE
 1110 IF key$="L" lowercase=TRUE
 1120 IF key$="P" pictures=TRUE
 1130 UNTIL INSTR("ULP",key$)
 1140 COLOUR 2:PRINT key$;" selected.
";
 1150 VDU 7:TIME=0:REPEAT UNTIL TIME>
300:CLS
 1160 ENDPROC
 1170 DEF PROCscreen
 1180 PROCtitle
 1190 CLS:COLOUR 3:PRINT CHR$224;CHR$
225;CHR$226;CHR$227;CHR$228;"  ";CHR$
229;CHR$230;CHR$231;CHR$232;" ";CHR$2
27;CHR$228
 1200 PROCchars
 1210 COLOUR 7:X%=992:Y%=32:man=1
 1220 GCOL 0,1:H%=2:W%=2:BIG$=CHR$243
:MOVE1152,768:CALL B%,BIG$:MOVE 1152,
704:BIG$=CHR$244:CALL B%,BIG$:GCOL 0,
2:MOVE 1152,704:BIG$=CHR$246:CALL B%,
BIG$:BIG$=CHR$245:MOVE1152,768:CALL B
%,BIG$
 1230 COLOUR 5:PRINT TAB(15,10);STRIN
G$(5,CHR$249):COLOUR 130:PRINT TAB(14
,31);"     ";:COLOUR 3:COLOUR 128:PRI
NT TAB(16,30);STRING$(24,CHR$248+CHR$
8+CHR$11)
 1240 H%=2:W%=2:GCOL 0,4:MOVE X%,Y%:B
IG$=CHR$252:CALL B%,BIG$:MOVE X%,Y%+6
4:BIG$=CHR$251:CALL B%,BIG$:GCOL 0,1:
MOVE X%,Y%+64:BIG$=CHR$250:CALL B%,BI
G$
 1250 COLOUR 7:PRINT TAB(0,2)"  1
2   3"''''''''"  4   5   6"''''''''"
  7   8   9"
 1260 GCOL 0,7:MOVE 310,0:DRAW 620,0:
DRAW 620,250:DRAW 310,250:DRAW 310,0
 1270 FOR I%=300 TO 972 STEP 224
 1280 MOVE 0,I%:DRAW 930,I%
 1290 NEXT
 1300 FOR I%=0 TO 930 STEP 310
 1310 MOVE I%,300:DRAW I%,972
 1320 NEXT
 1330 IF pictures PROCpics:char=222+2
*RND(4)
 1340 IF lowercase char=96+RND(16)
 1350 IF capitals char=64+RND(16)
 1360 A%=char:H%=4:W%=2
 1370 FOR J%=770 TO 200 STEP -224
 1380 FOR I%=100 TO 720 STEP 310
 1390 MOVE I%,J%
 1400 IF pictures GCOL 0,colour%(char
-223):BIG$=CHR$(char):CALL B%,BIG$:GC
OL 0,colour%(char-222):MOVE I%,J%:BIG
$=CHR$(char+1):CALL B%,BIG$:char=char
+2 ELSE GCOL 0,RND(6):BIG$=CHR$(char)
:CALL B%,BIG$:char=char+1
 1410 NEXT
 1420 NEXT
 1430 ENDPROC
 1440 DEF PROCman
 1450 SOUND 0,-15,5,2
 1460 man=-man:H%=2:W%=2:COLOUR 3:Y%=
Y%+64:MOVE X%,Y%+64:GCOL 0,1:BIG$=CHR
$250
 1470 PRINT TAB(15,33-Y%DIV32);STRING
$(5," "+CHR$248+" "+CHR$8+CHR$8+CHR$8
+CHR$11);TAB(15,10);CHR$17;CHR$5;CHR$
249;CHR$9;CHR$249
 1480 CALL B%,BIG$:MOVE X%,Y%:GCOL 0,
4:IF man=1 BIG$=CHR$252:CALL B%,BIG$:
MOVE X%,Y%+64:BIG$=CHR$251:CALL B%,BI
G$ ELSE BIG$=CHR$254:CALL B%,BIG$:MOV
E X%,Y%+64:BIG$=CHR$253:CALL B%,BIG$
 1490 ENDPROC
 1500 DEF PROCquestion
 1510 COLOUR 8:PRINT TAB(7,25);"?"
 1520 answer=RND(9)
 1530 VDU 24,318;4;612;246;
 1540 H%=4:W%=2:MOVE 410,25
 1550 IF pictures BIG$=CHR$(A%-2+answ
er*2):GCOL 0,colour%(A%-225+answer*2)
:CALL B%,BIG$:MOVE 410,25:BIG$=CHR$(A
%-1+answer*2):GCOL 0,colour%(A%-224+a
nswer*2):CALL B%,BIG$ ELSE BIG$=CHR$(
(A%-1+answer)AND &DF):GCOL 0,7:CALL B
%,BIG$
 1560 REPEAT key$=GET$:*FX21,0
 1570 IF VAL key$<>answer SOUND 1,-15
,0,10
 1580 UNTIL VAL key$=answer
 1590 CLG:VDU 26
 1600 ENDPROC
 1610 DEF PROCassemble
 1620 char=&87:block=&85:counter=&85:
limit=&86:string=&83:length=&82:addre
ss=&80:x=&7E:y=&7C:byte=&7B:height=&7
A:width=&79:mode=&78:data=&70:!data=&
02080402:data!4=&01010804:H%=&420:W%=
&45C:X%=&310:Y%=&312:oswrch=!&20E AND
 &FFFF
 1630 osword=!&20C AND &FFFF:paramete
r=&600:B%=&900:FOR pass=0 TO 2 STEP 2
:P%=B%:[OPT pass:LDX &355:LDA data,X:
STA mode:LDA parameter:BEQ error:LDA
parameter+1:STA block:LDA parameter+2
:STA block+1:LDY #0:LDA (block),Y:STA
 string:INY
 1640 LDA (block),Y:STA string+1:INY:
INY:LDA (block),Y:BEQ error:STA limit
:LDA #0:STA counter:.loop5 LDY counte
r:LDA (string),Y:STA char:LDA #10:LDX
 #char:LDY #0:JSR osword:JSR print:IN
C counter:LDA counter:CMP limit:BCC l
oop5:RTS
 1650 .error BRK:]?P%=4:P%=P%+1:$P%="
Big error!":P%=P%+LEN($P%):[OPTpass:B
RK:.print LDA Y%:STA y:LDA Y%+1:STA y
+1:LDA X%:STA x:LDA X%+1:STA x+1:LDY
#7:.loop1 LDA H%:BEQ error:STA height
:.loop2 LDA x:STA X%:LDA x+1:STA X%+1
:LDA char+1,Y
 1651 STA byte:LDA Y%:CLC:ADC #4:STA
Y%
 1660 LDA Y%+1:ADC #0:STA Y%+1:LDX #8
:.here LDA W%:BEQ error:STA width:ASL
 byte:PHP:BCC next:.loop3 JSR plot:.n
ext LDA X%:CLC:ADC mode:STA X%:LDA X%
+1:ADC #0:STA X%+1:DEC width:BEQ carr
yon:PLP:PHP:BCC next:BCS loop3:.carry
on PLP:DEX
 1670 BNE here:DEC height:BNE loop2:D
EY:BPL loop1:LDA y:STA Y%:LDA y+1:STA
 Y%+1:RTS:.plot LDA #25:JSR oswrch:LD
A #69:JSR oswrch:LDA X%:JSR oswrch:LD
A X%+1:JSR oswrch:LDA Y%:JSR oswrch:L
DA Y%+1:JMP oswrch:]:NEXT
 1680 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 197.

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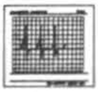

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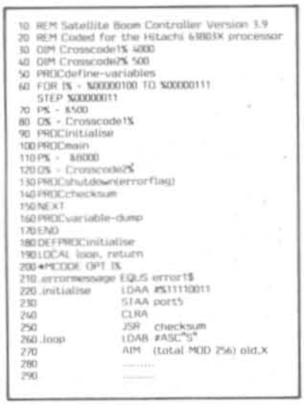

```
10  REM Satellite Boom Controller Version 3.9
20  REM Coded for the Hitachi 63803X processor
30  DIM Crosscode1% 4000
40  DIM Crosscode2% 500
50  PROCdefine-variables
60  FOR I% - %00000100 TO %00000111
    STEP %00000011
70  P% - &500
80  O% - Crosscode1%
90  PROCinitialise
100 PROCmain
110 P% -  &8000
120 O% - Crosscode2%
130 PROCshutdown(errorflag)
140 PROCchecksum
150 NEXT
160 PROCvariable-dump
170 END
180 DEFPROCinitialise
190 LOCAL loop, return
200 *MCODE OPT I%
210 .errormessage EQUS error1$
220 .initialise       LDAA #%11110011
230                   STAA port5
240                   CLRA
250                   JSR  checksum
260 .loop             LDAB #ASC"S"
270                   AIM  (total MOD 256) old.X
280                   ........
290                   ........
```

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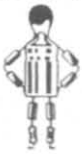

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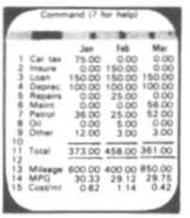

```
           Command (? for help)

              Jan     Feb     Mar
 1 Car tax   75.00    0.00    0.00
 2 Insure     0.00  150.00    0.00
 3 Loan     150.00  150.00  150.00
 4 Deprec   100.00  100.00  100.00
 5 Repairs    0.00   25.00    0.00
 6 Maint      0.00    0.00   56.00
 7 Petrol    36.00   25.00   52.00
 8 Oil        0.00    5.00    0.00
 9 Other     12.00    3.00    3.00
10          ------  ------  ------
11 Total    373.00  458.00  361.00
12          ------  ------  ------
13 Mileage  600.00  400.00  850.00
14 MPG       30.33   29.12   29.75
15 Cost/ml    0.62    1.14    0.42
```

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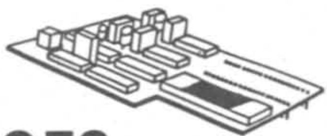

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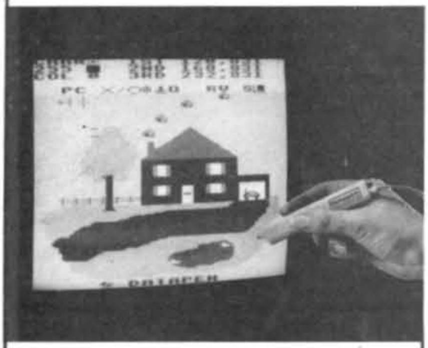

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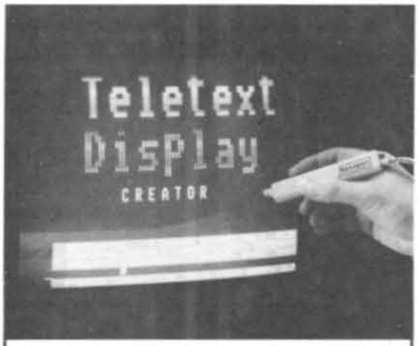

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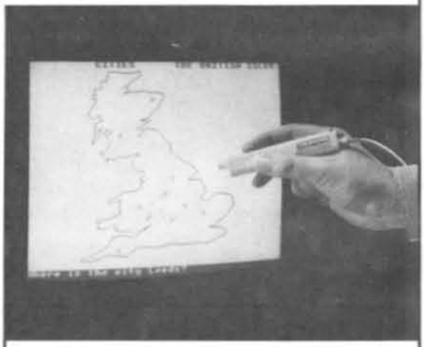

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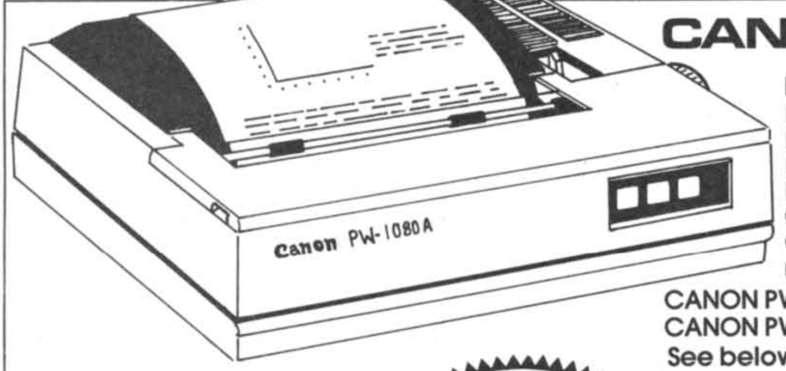

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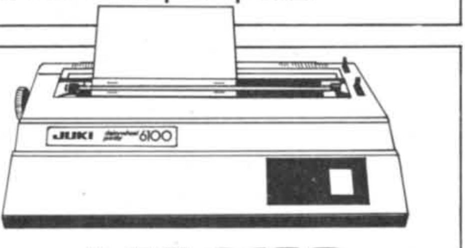

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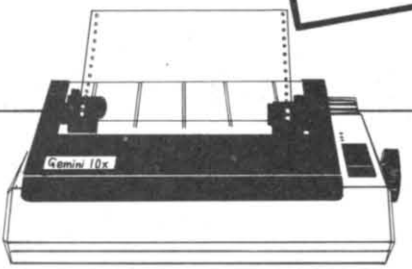

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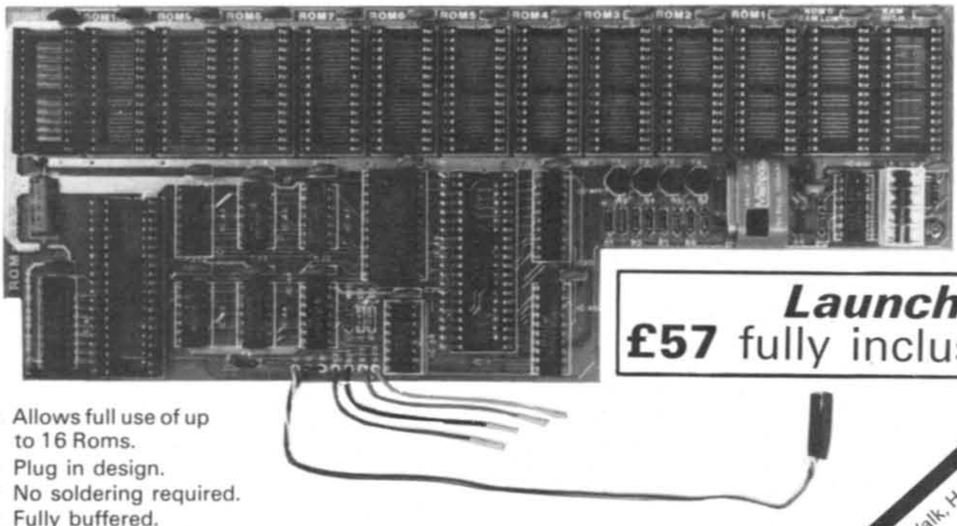

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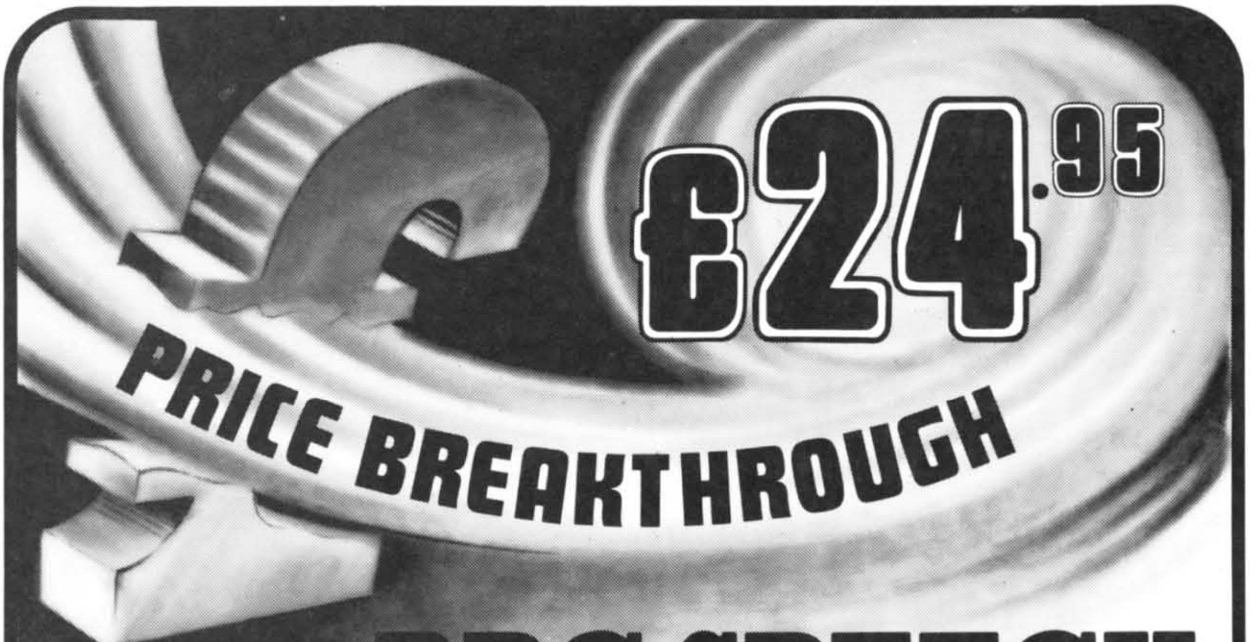
Rover listing

From Page 118

```
   10 REM ROVER
   20 REM (c) The Micro User
   30 ONERRORVDU7,4:COLOUR2:REPORT:PR
INT" at line ";ERL:END
   40 *K.0 MO.7:V.7,7,7:P."Downloadin
g !":A=PA.-&E00:*T.|MPA.=&E00:F.I%=&E
00+A TO TOP ST.4:!(I%-A)=!I%:N.|MOLD|
MG.70|M
   50 IFPAGE=&E00THEN70 ELSE*FX138,0,
128
   60 END
   70 sc%=0:hs%=0:MODE7:PROCinit:PROC
chars:hs%=-1
   80 MODE1:VDU23;8202;0;0;0;:PROCvar
s:PROCscrn:PROCfood:PROCtree:REPEAT:*
FX202,48
   90 VDU23;8202;0;0;0;:a$=INKEY$(0)
  100 *FX21,0
  110 IFa$="z"ANDx%>6 ANDsq(x%/2-3,y%
/2-1)<>0 a%=-2:u%=0:GOTO190
  120 IFa$="x"ANDx%<33 ANDsq(x%/2-1,y
%/2-1)<>0 a%=2:u%=0:GOTO190
  130 IFa$="k"ANDy%>5 ANDsq(x%/2-2,y%
/2-2)<>0 a%=0:u%=-2:GOTO190
  140 IFa$="m"ANDy%<28 ANDsq(x%/2-2,y
%/2)<>0 a%=0:u%=2
  150 IFa$="K" PROCscrollup
  160 IFa$="M" PROCscrolldown
  170 IFa$="q"THEN*FX210,1
  180 IFa$="w"THEN*FX210,0
  190 COLOUR0:PRINTTAB(x%,y%);dog$:sq
(x%/2-2,y%/2-1)=0:IFa%<>0 ORu%<>0 SOU
ND1,1,10,1
  200 x%=x%+a%:y%=y%+u%:a%=0:u%=0:COL
OUR3:PRINTTAB(x%,y%);dog$:mem%=sq(x%/
2-2,y%/2-1)
  210 IFsheet%>5 df=1 ELSEdf=2
  220 IFct%/df=INT(ct%/df)ANDsheet%>2
 PROCcat
  230 IFmem%=6 SOUND3,3,100,1:PROCfoo
d:sc%=sc%+fly%:fd%=fd%+1:mem%=0:IFfd%
=fin% fin%=fin%+1:fd%=0:PROCbonus:fly
%=fc%:x%=20:y%=20:PROCscrn:PROCfood:P
ROCtree:sheet%=sheet%+1:IFfc%>50 fc%=
fc%-10
  240 IFmem%=3 PROCfight:mem%=0
  250 IFmem%=2 sc%=sc%+10:mem%=0:SOUN
D3,2,70,1
  260 IFmem%=5 tlt=1000:SOUND0,-15,12
,15
  270 IFx%=fx% ANDy%=fy% sc%=sc%+fly%
:scr%=scr%+1:PROCfood
  280 PROCupdate:ct%=ct%+1:tlt=tlt-1:
PRINTTAB(31,1);tlt;" ":IFtlt<1 fly%=-
1
  290 IFcx%=x% AND cy%=y% ANDsheet%>2
 fly%=-10
  300 IFfly%<1 MODE7:VDU23;8202;0;0;0
;:PROCend:PROCinit:MODE1:PROCvars:PRO
Cscrn:PROCtree:PROCfood
  310 COLOUR0:PRINTTAB(17,1);sc%:COLO
UR2:PRINTTAB(17,1);sc%
  320 UNTILFALSE
  330 DEFPROCvars
  340 ENVELOPE2,1,1,1,1,4,4,4,-1,-1,-
1,-1,126,126:ENVELOPE1,1,1,1,1,5,5,5,
-5,-1,-1,-1,126,126:ENVELOPE3,1,14,14
,14,3,3,3,-1,-1,-1,-1,126,126:ENVELOP
E4,5,1,1,1,10,10,10,0,0,0,-1,126,126
  350 sc%=0:dog$=CHR$224+CHR$225+CHR$
10+CHR$8+CHR$8+CHR$227+CHR$226:bone$=
CHR$232+CHR$233+CHR$10+CHR$8+CHR$8+CH
R$235+CHR$234:cat$=CHR$236+CHR$237+CH
R$8+CHR$8+CHR$10+CHR$239+CHR$238:sk%=
1:x%=20:y%=20
  360 food$=CHR$5+CHR$10+CHR$18+CHR$0
+CHR$3+CHR$228+CHR$229+CHR$8+CHR$8+CH
R$18+CHR$0+CHR$1+CHR$231+CHR$230+CHR$
4
  370 ct%=0:fly%=0:a%=0:u%=0:tlt=1000
:fd%=0:fin%=8:fc%=80:cx%=20:cy%=10:sh
eet%=1:tx%=0:ty%=0
  380 IFhs%=-1DIMsq(16,14),t(14):hs%=
0
  390 tree$=CHR$248+CHR$249+CHR$10+CH
R$8+CHR$8+CHR$251+CHR$250
  400 ENDPROC
  410 DEFPROCscrn
  420 CLS:GCOL0,1:PLOT69,40,1023:MOVE
40,1023:PLOT81,1280,0:PLOT81,0,-98:PL
OT81,-1280,0:PLOT81,0,98
  430 GCOL0,3:PLOT69,120,1003:MOVE120
,1003:PLOT81,1080,0:PLOT81,0,-58:PLOT
81,-1080,0:PLOT81,0,58
  440 COLOUR2:PRINTTAB(10,1);"SCORE "
;sc%;TAB(26,1);"TIME ";tlt
  450 FORi%=1TO15:FORj%=1TO13:sq(i%,j
%)=1:NEXT:NEXT
  460 a$=CHR$18+CHR$1+CHR$1+CHR$5+CHR
$240+CHR$241+CHR$10+CHR$8+CHR$8+CHR$2
43+CHR$242+CHR$11
  470 block$=a$:Sr%=896:En%=96:Sp%=-6
4:Xc%=192:St%=10:Ss%=5
  480 FORi%=Sr%TOEn%STEPSp%:MOVEXc%,i
%:PRINTSTRING$(St%,a$);STRING$(Ss%,a$
):NEXT
  490 VDU4
  500 COLOUR3:FORi%=1TOfin%-2:x=(RND(
15)*2)+4:y=(RND(12)*2)+2:PRINTTAB(x,y
);bone$:sq(x/2-2,y/2-1)=2:NEXT
  510 COLOUR2:FORi%=1TOfin%-4:x=(RND(
15)*2)+4:y=(RND(12)*2)+2:PRINTTAB(x,y
);cat$:sq(x/2-2,y/2-1)=3:NEXT
  520 ENDPROC
  530 DEFPROCfood
  540 fly%=fc%:REPEAT:fx%=(RND(15)*2)
+4:fy%=(RND(12)*2)+2:UNTILfx%<>x% AND
fy%<>y% ANDfx%<>tx% ANDfx%<>ty%
  550 MOVEfx%*32,1024-(fy%*32):PRINTT
AB(fx%,fy%);food$
  560 ENDPROC
  570 DEFPROCupdate
  580 IFct%/sk%<>INT(ct%/sk%) ENDPROC
  590 COLOUR2:PRINTTAB(fx%,fy%);"  ";
TAB(fx%,fy%);fly%:fly%=fly%-1
  600 sq(fx%/2-2,fy%/2-1)=6
  610 ENDPROC
  620 DEFPROCtree
  630 REPEAT:tx%=(RND(15)*2)+4:ty%=(R
ND(12)*2)+2:UNTILtx%<>x% ANDty%<>y%
  640 COLOUR2:PRINTTAB(tx%,ty%);tree$
  650 sq(tx%/2-2,ty%/2-1)=5
  660 ENDPROC
  670 DEFPROCfight
  680 FORi=1TORND(10)+RND(10)
  690 FORg=1TO25:NEXT:COLOUR2:PRINTTA
B(x%,y%);cat$:FORg=1TO25:NEXT:COLOUR3
:PRINTTAB(x%,y%);dog$:VDU19,0,RND(8)-
1;0;0;19,3,0;0;0;
  700 IFfly%> 20fly%=20
  710 SOUND0,-15,10+RND(3),5:NEXT:*FX
15
  720 VDU20:ENDPROC
  730 DEFPROCscrollup
  740 y%=y%-2:IFy%<4 y%=28
  750 IFcx%=x% cy%=cy%-2:IFcy%<4 cy%=
28
  760 IFfx%=x% fy%=fy%-2:IFfy%<4 fy%=
28
  770 v=sq(x%/2-2,1)
  780 FORh%=12TO1STEP-1:t(h%)=sq(x%/2
-2,h%+1):NEXT:FORh%=1TO12:sq(x%/2-2,h
%)=t(h%):NEXT:sq(x%/2-2,13)=v
  790 VDU28,x%,29,x%+1,4
  800 PRINTTAB(0,24);:PRINT''
  810 SOUND0,-10,13,5:*FX21,0
  820 VDU28,0,31,39,0
  830 PROCprint(x%,28,1024)
  840 ENDPROC
  850 DEFPROCprint(px,py,v)
  860 IFv=1 MOVEpx*32,v-(py*32):PRINT
block$:VDU4:ENDPROC
  870 IFv=0 COLOUR0:PRINTTAB(px,py);d
og$:COLOUR3:ENDPROC
  880 IFv=2 COLOUR3:PRINTTAB(px,py);b
one$:ENDPROC
  890 IFv=3 COLOUR2:PRINTTAB(px,py);c
at$:ENDPROC
  900 IFv=5 COLOUR2:PRINTTAB(px,py);t
ree$:ENDPROC
  910 IFv=6 MOVEpx*32,1023-(py*32):PR
INTTAB(px,py);food$
  920 ENDPROC
```



BBC SPEECH

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Side A
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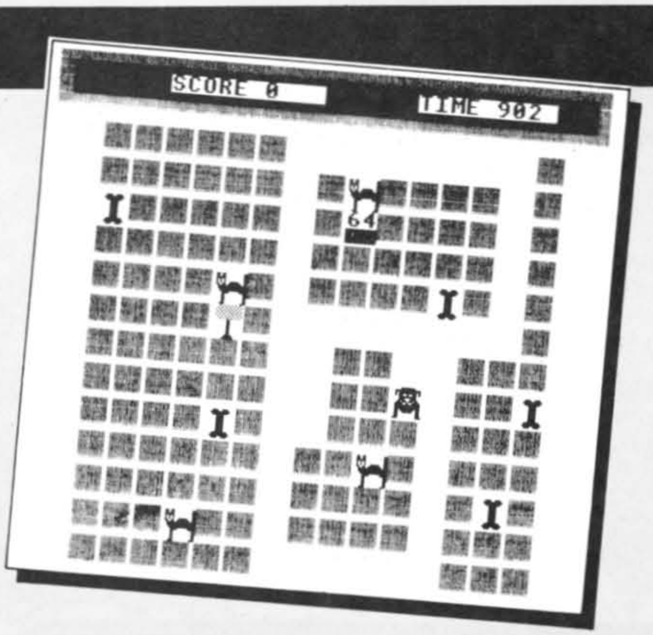
London EC1R 3DJ. Tel: 01 833 4909.
Telex: 8954958.

Rover listing

From Page 171

```
  930 DEFPROCscrolldown
  940 y%=y%+2:IFy%>28 y%=4
  950 IFcx%=x% cy%=cy%+2:IFcy%>28 cy%
=4
  960 IFfx%=x% fy%=fy%+2:IFfy%>28 fy%
=4
  970 v=sq(x%/2-2,13)
  980 FORh%=2TO13:t(h%)=sq(x%/2-2,h%-
1):NEXT:FORh%=2TO13:sq(x%/2-2,h%)=t(h
%):NEXT:sq(x%/2-2,1)=v
  990 VDU28,x%,29,x%+1,4
 1000 PRINTTAB(0,0);:VDU11,11
 1010 SOUND0,-10,13,5:*FX21,0
 1020 VDU28,0,31,39,0:PROCprint(x%,4,
1024):ENDPROC
 1030 DEFPROCbonus
 1040 a=INKEY(0):CLS:SOUND1,4,100,1:S
OUND2,4,101,1
 1050 VDU22,7:d$=CHR$131+CHR$141+"BON
US stage number "+STR$sheet%:y=10:FOR
i=1TO2:PROCtelex:NEXT:y=y+2:d$=CHR$13
5+"Press any key to make Rover land "
:PROCtelex:d$="on his food.":PROCtele
x
 1060 TIME=0:REPEAT:UNTILTIME>300:VDU
22,1,23;8202;0;0;0;
 1070 FORi=0TO39STEP2:COLOURRND(4):PR
INTTAB(i,28);tree$:NEXT:ac=RND(18)*2:
COLOUR0:PRINTTAB(ac,28);dog$:MOVEac*3
2,128:PRINTfood$
 1080 x=0:y=0
 1090 REPEAT:COLOUR0:PRINTTAB(x,y);do
g$:x=x+2:IFx>39 x=0:y=y+2
 1100 COLOUR3
 1110 PRINTTAB(x,y);dog$
 1120 FORg=1TO100:NEXT
 1130 IFy=28 VDU22,7:a$=CHR$141+CHR$1
31+CHR$136+"No bonus !!":PRINTTAB(0,1
0):FORi=1TO2:PRINTSPC(12);a$:NEXT:SOU
ND0,-15,10,40:a=INKEY(300):VDU22,1:EN
DPROC
 1140 UNTILINKEY(0)<>-1
 1150 FORi=y TO 27:COLOUR3:PRINTTAB(x
,i);dog$:COLOUR0:SOUND3,-15,128-i,1:F
ORg=1TO100:NEXT:PRINTTAB(x,i);dog$:NE
XT
 1160 COLOUR3:PRINTTAB(x,i);dog$
 1170 IFx=ac SOUND2,3,100,1:SOUND3,3,
101,1:a=INKEY(200):VDU22,7:a$=CHR$141
+CHR$135+CHR$136+"Bonus "+STR$((31-y)
*10):sc%=sc%+(31-y)*10:PRINTTAB(0,10)
:PRINTTAB(0,10):FORj=1TO2:PRINTSPC(12
);a$:NEXT:a=INKEY(300):VDU22,1:ENDPRO
C
 1180 SOUND0,-15,2,30:a=INKEY(200):EN
DPROC
 1190 DEFPROCinit
```



```
 1200 VDU23;8202;0;0;0;:*FX21,0
 1210 LOCALx,y
 1220 :FORi=0TO24:PRINTTAB(0,i);CHR$1
57:NEXT
 1230 y=4:d$=CHR$141+CHR$132+CHR$157+
CHR$131+"ROVER "+CHR$135+CHR$157+CHR$
140:FORi=1TO2:PROCtelex:NEXT
 1240 y=y+2:d$=CHR$129+"By Graham D.
Walkden":PROCtelex
 1250 IFsc%>hs% hs%=sc%
 1260 d$=CHR$141+CHR$130+"Last score
"+STR$sc%+" ":y=y+2:FORi=1TO2:PROCtel
ex:NEXT:d$=CHR$141+CHR$130+"High scor
e "+STR$hs%+" ":y=y+1:FORi=1TO2:PROCt
elex:NEXT
 1270 d$=CHR$141+CHR$133+CHR$136+"Pre
ss any key for another game  ":y=y+2:
FORi=1TO2:PROCtelex:NEXT
 1280 A=GET:ENDPROC
 1290 DEFPROCtelex:x=(40-LENd$)/2:PRI
NTTAB(x,y);d$:y=y+1:ENDPROC
 1300 DEFPROCend
 1310 SOUND1,4,100,1:SOUND2,4,110,1:S
OUND3,4,120,1
 1320 y=10:d$=CHR$132+CHR$157+CHR$135
+CHR$141+"GAME OVER  "+CHR$156:FORi=1
TO2:PROCtelex:NEXT:FORi=1TO10000:NEXT
i:*FX21,0
 1330 CLS:ENDPROC
 1340 DEFPROCcat
 1350 v=sq(cx%/2-2,cy%/2-1)
 1360 IFv=1 COLOUR0:PRINTTAB(cx%,cy%)
;dog$:sq(cx%/2-2,cy%/2-1)=0:ELSEPROCp
rint(cx%,cy%,1024)
 1370 IFcx%>30 cx%=cx%-2:GOTO1400
 1380 IFcx%<8 cx%=cx%+2:GOTO1400
 1390 cx%=cx%+((RND(2)-1)-(RND(2)-1))
*2
 1400 IFcy%>26 cy%=cy%-2:GOTO1430
 1410 IFcy%<6 cy%=cy%+2:GOTO1430
 1420 cy%=cy%+((RND(2)-1)-(RND(2)-1))
*2
 1430 COLOUR3:PRINTTAB(cx%,cy%);cat$:
ENDPROC
 1440 DEFPROCchars
 1450 VDU23,224,15,127,95,89,31,28,54
,121,23,225,224,252,244,52,240,112,21
6,60,23,226,252,252,236,204,12,12,14,
0,23,227,127,127,111,103,96,96,224,0,
23,228,127,255,140,165,165,165,140,25
5,23,229,254,255,33,175,169,169,33,25
5
 1460 VDU23,230,0,0,222,80,86,86,222,
0,23,231,0,0,115,90,90,90,115,0,23,23
2,0,14,31,15,3,3,3,3,23,233,0,112,248
,240,192,192,192,192,23,234,192,192,1
92,192,240,248,112,0,23,235,3,3,3,3,1
5,31,14,0,23,236,0,216,216,248,168,16
9,219,127
 1470 VDU23,237,0,3,3,3,3,243,251,255
,23,238,255,255,15,3,3,3,3,7,23,239,1
27,63,30,24,24,24,24,56,23,240,0,255,
255,255,255,255,255,255,23,241,0,252,
252,252,252,252,252,252,23,242,252,25
2,252,252,252,252,0,0,23,243,255,255,
255,255,255,255,0
 1480 VDU0,23,244,0,0,63,63,63,63,63,
63,23,245,0,0,255,255,255,255,255,255
,23,246,255,255,255,255,255,255,255,2
55,23,247,63,63,63,63,63,63,63,63,23,
248,21,42,85,42,85,42,21,1,23,249,84,
170,84,170,84,170,84,128
 1490 VDU23,250,128,128,128,128,128,1
28,192,224,23,251,1,1,1,1,1,1,3,7
 1500 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 197.

ARIES-B20 NOW JUST £79.95 INC P&P+VAT

Yes it's true! The remarkable ARIES-B20 is now better than ever value at just £79.95!

Remember: unlike 'Sideways-RAM' systems, ARIES-B20 offers you *transparent* access to 20K of extra memory, replacing the RAM swallowed up by the high-resolution graphics modes. The extra RAM is switched in completely automatically, meaning that existing software can make use of it *without modification*.

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And yet ARIES-B20 takes just 5 minutes to fit, with no flying leads to connect and no soldering or cutting!

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EXPANSION

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AVAILABLE

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The ARIES solution is not just all of the above, but also uniquely versatile – ARIES-B12 is the first ROM expansion which may be fitted either externally or internally.

ARIES-B12 provides a total of twelve Sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS Sideways ROM system. In addition, there are two sockets for Sideways RAM, giving up to 16K of RAM using two 6264 static RAM chips.

And like ARIES-B20, ARIES-B12 simply plugs into sockets in your BBC Micro. If you haven't yet got ARIES-B20, a small adaptor unit, ARIES-B12C, is available at nominal cost.

ALSO AVAILABLE: ARIES-B488 IEEE-488 BUS INTERFACE

ARIES range hardware requirement: BBC Microcomputer Model B; MOS 1.2

HOW TO GET ARIES

The ARIES range is now available through selected dealers. You may also order directly from Aries Computers at the address below. If you are not completely satisfied with your purchase, we will refund your money in full, provided that you return the goods within 14 days of shipment, undamaged, and in their original packaging. Please allow 21 days for delivery.

Product	Price (inclusive of VAT+P&P)	Product	Price (inclusive of VAT+P&P)
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ARIES-B12	£ 46.00	ARIES-B488	£270.25

Please add £3.50 carriage for overseas orders.

Aries Computers

Science Park, Milton Road, Cambridge CB4 4BH Telephone (0223) 862614

MICROMAIL

A stoney silence about Newport...

I DO hope that you are able to laugh at your own organisation and can publish this letter.

I recently ordered some goods from Micro User giving my full address and postcode on the order form.

Three weeks later nothing had arrived so I phoned up to check if my order had been received. After some delay I was advised "Yes, your goods were dispatched about a week ago BUT . . ., the bad news is that they were sent to Newport, Gwent. As this is the only Newport that our computer has heard of".

What about the one in the Isle of Wight, I said, and for that matter the other 10 in the British Isles? Stoney silence at the other end.

Joking apart, could someone please inform your mailing department that other Newports are alive and well! – **J. St. C. Lecky, of Newport, Essex.**

● It's a good job your name isn't John Smith.

Out one side, in the other

I LIKED your article about the 6845 chip in the August issue of The Micro User. But there is one thing I'd like to know.

How can you hardware scroll so a picture can go out of the screen at one side and another one come in at the other (like in Rocket Raid)? I would be grateful if you published how to do that.

Here is one hint for readers who want to auto run a machine code program (RUN when Break pressed). You cannot stop it with Break or even Ctrl+Break.

- *Type in the code (or load it).*
- *Type P%=&287.*
- *Type [JMP &N] where N is the start address of the code or execution address.*

Now you can Break as often as you want. You can use this in some games if you wish, but not with disc interface.

If you want to return to Basic switch off your BBC Micro or have an RTS in the end of the code that you want to auto-run. – **J.T. & S.T.G.**

● We are afraid the scrolling routine that you are after would fill an awful lot more space than we have available here.

However we will try and conjure up something for the not too distant future when we start our machine code graphics articles.

Take over by Acorn?

I HAVE subscribed to your magazine from the very first issue to date and have always enjoyed the information and articles therein.

Most of all I have always admired what I deemed to be your independence. As a magazine directed solely to the BBC and latterly to the Electron User, I found Barry Wood's articles on the shortfallings of Acorn admirable.

That was until last month when a minor piece gave the information about the scandalous increase in the price of the Z80 second processor for no good reason.

I searched in vain for some reaction to the increase. Nothing! Not despairing, I searched for Barry Wood's article. Nothing!

Can it be you've been taken over by Acorn?

I took my indignation to the Olympia show and tackled one of Acorn's representatives. I asked her how they could possibly justify such an enormous increase.

"That's because it's underpriced", she said.

"Hardly likely!" I retorted, "because a company the size of Acorn would be sure to add its profit to the manufacturing cost before setting the selling price of £299".

"Well in that case", she replied, "it's because we now include all this software as part of the package".

"But the software was part of the package at £299", I said.

"Well in that case I can't think of a reason", the honest young lady finally said.

"Oh I can!" I told her. "Greed!"

If I produced some part that Acorn used for their business at a profit to myself for say £200 and then because other people began to show an interest later told them I wanted £300 I believe the first to shout "Thief!" would be Acorn. – **Derek Denne, Brondesbury, London.**

● We can't afford to pay Barry any more. As soon as he saw the press release on the price increase he upped his rates immediately.

A fancy for the 3 inch

I AM about to invest in a drive and I fancy the 3in disc.

Problem is that your monthly disc of Micro User programs appears to apply to 5¼in discs only. Any suggestions? – **H. Morgan, Crossgal, Co. Down.**

● Now that 3in drives are becoming more popular we intend producing the monthly cassette and other software on that media.

I understand that back issues will be duplicated by request, although this has not yet been confirmed.

Simple solution

I BOUGHT second hand a BBC Model B which has given hours of pleasure to my family and worked perfectly well. However recently we typed in several of your games only to find the words "Bad Command" appear.

*The most recent was from the November issue and the game Duel where the screen showed "Bad Command on line 1840" (for example *FX21,0). Checking my BBC handbook revealed *FX21,0 is shown as new to the issue 1.0.*

There must be others in a similar situation to myself so could you please advise:

- *Whether my model can be updated and if so what should I do.*
- *Whether you could mark your games as not suitable for pre-issue 1.0 models to avoid my children's disappointment after hours of typing in.* – **Arthur Wright, Guiseley, Yorks.**

● Sorry to hear about your children's disappointment. However we have long adopted the policy of using OS1.2 as the standard for our games, as it is far superior to the earlier versions of the OS. We think you'll find that all other magazines have adopted this practice as well.

The upgrade to OS1.2 is quite simple and inexpensive. Your dealer will be more than happy to do it for you.

We strongly suggest that you have one fitted, as the more sophisticated programs appearing nowadays do make use of the extended facilities of this OS.

Infuriating Elite . . .

AS soon as I saw the adverts I bought an Elite, from Acornsoft. Having been a fan of Atari's Star Raiders for years I couldn't resist it.

I actually bought it a month ago but as it failed to work with a Pace DFS I had to by an Acorn DFS, price £28, but it would be worth it, I thought.

I got the DFS yesterday. Today I'm selling Elite! At 26

→

MICROMAIL

From Page 175

I'm reasonably coordinated and until now have had no problem with any computer game, but Elite is beyond me.

It's infuriating and potentially dangerous for computers as I've never felt more like taking an axe to the keyboard.

I can dock the ship all right, but as for combat it seems that every pirate in the galaxy is after me.

The only way to travel is without cargo, when nobody bothers you. But one ton of anything brings them like flies. They never miss a shot!

They can destroy you in less than 15 seconds. You don't stand a chance. I've even been shot at trying to dock at a supposedly safe space station!

Why does Elite not have simple left and right controls instead of this roll business? I spin like a top most of the time. My only hope is for the pirates to get dizzy.

I've yet to hit anything with the laser. I'll give Elite 10 out of 10 for graphics and content and minus five for playability. Star Raiders Forever! – **Paul R. Lemon, Aintree, Merseyside.**

. . . and more of the same

I FEEL I must write after reading your review of the new Acornsoft program Elite.

It is a superb program but it has the same fault as many other so called games – it starts off at too difficult a level.

To get to even a friendly Corporate State planet on your first try you are besieged by countless enemy ships which eliminate you before you can even find them, never mind identify them.

Your defences are pitiful and overwhelmed. You stand very little chance of even making first base after many boring reloadings.

There are numerous shapes of wireframe ships to identify, but you would be very fortunate to see one long enough to recognise it before the other ships eliminated you.

Why oh why can't these games programmers offer an easy start becoming progressively more difficult, instead starting at the very difficult and becoming impossible?

There are probably quite a few pimpled schoolboys whose reactions are much quicker than their elders but that does not justify making the games virtually impossible for the rest of us.

A game is only a game if it allows you a chance of winning. Continual failure is very depressing and I have quickly developed an anti-game attitude.

Elite has the potential to become a very interesting and absorbing game if something could be done in the early stages to reduce the numbers of those pesky marauders which prevent you from getting started. – **A.M.D., Exeter, Devon.**

● You can please some people all of the time and you can please all people some of the time, but . .

Just use a pad character

OH, tut-tut, oh woe! You seem to have slipped up a bit in your answer to Brian Kingham's letter on Wordwise in the November issue.

Maybe you use View more than Wordwise in which case I forgive you. (Being magnanimous I'll forgive you anyway!)

To get centralised underlined headings on Epson printers you don't need to do anything as longwinded as printing dummy spaces; just put a pad character between the CE and the OC27,45,1 like this:

```
gCEw:gOC27.45.1w
Chapter 56 gOC27.45.0w
```

where g and w mean green and white. Simple huh?!

You advised Gordon Price not to change mode inside procedures using VDU22,M as this will not affect HIMEM. While this is quite true there is no problem doing this if you set HIMEN at the start of your program to the lowest which it is needed to be.

For instance, if your program starts in Mode 7 (HIMEM=&7C00) but includes a procedure in which the mode may change to 2 (HIMEM=&3000) simply put the line "HIMEM=&3000" after the initial Mode 7.

Thereafter all mode changes must be made using VDU22, otherwise HIMEM will be reset.

Of course even when the computer isn't in Mode 2 you'll only have Mode 2's amount of memory to spare, but this is true even if you make the mode change outside the procedure.

Sorry about the niggle but I am laid up with the lurgi and don't feel particularly cheerful. – **Pete Gaunt, London N19**

● We have had lots of letters about our answer to Brian's problem, which just goes to show how a slight error can generate an enthusiastic response from our readers.

Thank you to all the other writers who could not be included and this closes the correspondence on this subject.

Governed by variable @%

IN the November 1984 issue of The Micro User your correspondent C.J. Rourke was having problems with number to string conversions. As he is probably aware the numbers in the examples which he gave cannot be stored as exact binary fractions on the BBC Micro.

When such a number is converted to a string using the STR$ command the string produced is the closest approximation in decimal to the binary number stored.

For example:

```
A=57.6: PRINT STR$(A)
```

will return 57.59999999.

However, executing:

```
A=57.6: PRINT A
```

will return 57.6 as expected.

This is because the format of numbers printed is governed by the variable @%. The default setting of @% is &90A, which means that any number with 10 decimal places (including the decimal point) will be displayed to nine places in a 10 character field. Thus 57.59999999 will be rounded and displayed to 57.6.

Setting the most significant

An ode to young Mike

DECISIONS, decisions, all the RND
decisions. What an apt title.
New to programming we may be,
Yet bugs are there for all to see,
Three times three nine must be,
Even to young Mike Bibby.

When a six is the die,
For you to try,
Then two times three cannot lie,
Even to Mike Bibby.
Yet – the problems I fear dark as the dyke
Are now made clear by young Mike.

Selecting data lines at will,
May need to be explained me still,
Easier though they are to fill,
Of course I bear young Mike no ill.

Let him keep his job I pray,
For his articles are OK,
If he errs just once today,
He can have another say.
– **Tony Lawrance,**
Leicester.

● Mike is rather embarrassed by all this, but came up with this reply:

Oh dear I fear
It's very clear
I dropped a clanger
Please don't sneer
And don't let my old tutor see
Or he'll revoke my maths degree.

So what was his mistake? We'd like to tell you but we have to work with him. Suffice it to say it's the oddest looking die we've ever seen.

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.*

byte of @% to &01 will cause the STR$ command to display the numbers in the format governed by @%.

Therefore if Mr/Ms Rourke types in:

@%=&0100090A then A=57.6: PRINT A, STR$(A), LEN STR$(A) will return:

57.6 57.6 4

Which is the response expected.

A more detailed treatment of the use of @% can be found on pages 324-327 of the BBC Micro User Guide. – **M.K. Smith, Wrexham, Clwyd.**

Praise for Pace

MIGHT I congratulate Pace Software Supplies. I was trying to make their Amcom DFS work using OSGBPB for an automatic menu driver but when A was set above 5 it would not function in their extended mode.

After a phone call I was told that a later DFS was available which rectified this and it also had extra commands.

I agreed to buy this on a swop basis and received this in less than 24 hours. Well done! And that goes for the Post Office, too.

Well it's now in my BBC Micro and certainly worth the £5 (which included a new utility disc). The best new feature, apart from the support of OSGBPB, is the fact that system selection is now automatic, which enables me to copy files from the Extended to Acorn modes direct.

This saves a lot of time and trouble, along with the fact that after a Break I don't get a "Bad system" error when loading programs or files.

The extra commands are:

**ADD Allows you to add to a BUILT file.*

**MOVE An automatic version of *COPY.*

**SPACE Give the amount of space left and space between individual files.*

**HELP DFS Help page which it didn't have before.*

– **Mr M.R. Sarre, Norwich, Norfolk.**

. . . lend me your ears!

DEAR friends, Romans and countrymen, I believe I have invented the known world's first Roman calculating machine, but when I offered it to the local moneylender, Maximus Idioticus, he said it would not replace the abacus.

I am therefore giving away this DIY kit to anyone who owns a Beebus XVI or Beebus XXXII. All I wish in return is information on how to squeeze XII copies of Micro User into I Micro User binder.

*To use calculator enter your sums in Roman numerals with functions + – * / in logical order, press = and eureka!* – **Adrian Drover, Glasgow, Upper Barbaria.**

```
   10 REM ROMAN CALCULATOR
   20 *TV 255
   30 MODE 7
   40 REPEAT
   50 PRINTCHR$131"ENTER TH
Y CALCULATIONS FRIEND"
   55 A%=0:R%=0:F$="+":EA%=
0
   60 REPEAT
   70 N%=0:E%=0:HV%=0
   80 REPEAT I$=INKEY$(0)
   90 RESTORE 480
  100 FOR L%= 1TO 12
  110 READ R$,V%
  120 IF R$=I$ N%=FN_ADD:HV
%=V%:HR$=R$;PRINTR$;:IF L%>
7 E%=-1:IF L%=12 EA%=-1
  130 NEXT
  140 UNTIL E%
  150 IF F$="+" A%=A%+N%
  160 IF F$="-" A%=A%-N%
  170 IF F$="*" A%=A%*N%
  180 IF F$="/" A%=A%/N%
  190 F$=HR$
  200 PRINT
  210 UNTIL EA%
  220 PROC_SUM(A%)
  230 IF R%>0 PRINT "REMAIN
DER ";:PROCSUM(R%)
  240 PRINT;CHR$130" QED"''

  250 UNTIL0
  260 REM*******************
********
  270 DEF FN_ADD
  280 N%=N%+V%
  290 IF V%>HV% N%=N%-HV%*2
  300 =N%
  310 REM*******************
********
  320 DEFPROC_SUM(N%)
  330 A%=1E3:RESTORE 490
  340 REPEAT
  350 PROC_FIG:A%=A%*9/10
  360 PROC_FIG:A%=A%*5/9
  370 PROC_FIG:A%=A%*4/5
  380 PROC_FIG:A%=A%/4
  390 UNTIL A%=1
  400 PROC_FIG
  410 ENDPROC
  420 REM*******************
********
  430 DEF PROC_FIG
  440 READ R$
  450 IF N%>=A% U%=N% DIV A
%:N%=N% MOD A%:FOR L%= 1 TO
 U%:PRINTR$;:NEXT
  460 ENDPROC
  470 REM*******************
********
  480 DATA M,1000,D,500,C,1
00,L,50,X,10,V,5,I,1,+,0,-,
0,*,0,/,0,=,0
  490 DATA M,CM,D,CD,C,XC,L
,XL,X,IX,V,IV,I
```

Replacement ribbons

I HAVE a Seikosha GP80A printer for which I am having the utmost difficulty in getting suitable replacement ribbons. When I first bought the machine I had two original ribbons with it and, although I had to make a slight modification to the machine to make even those work properly, I had little real trouble.

Since the second one of those gave up the ghost about a year ago I have tried every source possible to obtain suitable replacements.

I have been offered GP100 ribbons and told they would suit when they are patently unsuitable being 11in instead of 8in, which the GP80's are.

I have taken the original ones into all the shops within reasonable reach only to find that all they could offer were clearly longer than the original, although that had obviously stretched in use.

The machine depends on the ribbon being under tension for its correct operation and if the ribbon is too long to start with, it won't feed properly. And they do tend to stretch in use. In addition, the original ribbons were obviously specially woven in a continuous loop.

The only ones I have been offered in all my efforts are made with a joint in them. A very neat joint admittedly but I can't help thinking that a lump of hard adhesive going under the print head every few seconds cannot do anything but reduce its life.

I would greatly appreciate any help you can give me. – **R.G. Ledieu, Thornton-Cleveleys, Lancs.**

● You should be able to get what you want from DRG Business Systems 13/14, Lynx Crescent, Winterstoke Road, Weston-super-Mare, Avon. Tel: 0934 419914.

They say that if they cannot give you the name of a local agent they can provide you with the goods themselves.

I want to make war!

PLEASE can we have a tank battle game? You know, the type that was on the very first video games. I have that game, but don't know of any version for the BBC.

Can someone write one with a

→

MICROMAIL

From Page 177

few BBC goodies as improvements. (Better graphics etc.) and options of joystick or keyboard control.

How about encouraging readers to suggest games and new ideas? It strikes me that the major software houses are running out of ideas. – **D.J. Steel, Leeds, Yorks.**

● We are sure you'll find exactly what you want on our Classic Arcade Games cassette. It is called Panzer Attack and is one of four games on the cassette which can be obtained from our mail order department.

See the order form on Page 197.

Radiotherapy challenge

I WOULD be grateful if you or your readers could help me design a program to be used in the radiotherapy department of our local hospital.

As part of this program I wish to display the contents of a two dimensional array which will be too large to display on the screen at any one time.

I would like to be able to vertically and horizontally scroll the display so as to be able to alter or update any individual "cell", but can find no reference as to how to do this. I suspect that I am really asking for help in designing a form of spreadsheet. Can you please help? – **John Hammonds, Plymouth, Devon.**

● What you suggest could be done in Basic using a two-dimensional array. However, even at the speed of the BBC Micro it might be too slow. Any reader care to prove us wrong?

Transferring Mini Office

I OWN a BBC B and would like to know if I buy the tape-based Mini Office will I be able to transfer it to disc when I upgrade to disc drives sometime later this year.

Also I will shortly be taking delivery of a Brother HR5 printer. Since this is about the cheapest one on the market I believe it may become very popular with BBC Micro users, so how about a screen dump program or an amendment to the Epson dump published sometime earlier. – **A. Potter, Horsham, West Sussex.**

● Sorry, the cassette version of Mini Office is protected, as is most professional software these days.

With regards to the screen dump, perhaps one of our clever readers might come up with something.

In support of PROC

I WAS interested to read the letter from Colin M. Johnson in the November issue of Micro User. What puzzles me is why someone who can write such a witty letter can be capable of missing the point.

I certainly cannot stop him using GOTO and GOSUB in his programs if he wishes, so long as he does not want to sell them to me, but he obviously doesn't realise what the argument in favour of procedures and functions is.

He says that GOTO is considered muddling while PROC although "it can take a minute or two to find, is oddly thought a great improvement".

The risk of confusion is not in the line containing the GOTO, it is in the part of the program to which it points.

As I read through a program if I see DEFPROC I am immediately aware that this piece of code is called from another part of the program and, by looking for the corresponding ENDPROC, I can determine the limits of the called segment.

In addition to these advantages I can, if the procedures and functions have been given sensible names, tell what the called segment will do as soon as I see the PROC statement.

PROCprint labels must be more informative than GOSUB 1500.

Another factor, rarely considered by home programmers, is the maintenance of programs. It is no test of the quality of a program that it works – if it doesn't it has no right to be called a program.

A much more sensible test is to ask how easy is it to make minor changes. If someone asks for the high score table to be written to, and read from, a disc so that high scores can be retained from one session to another, does it require a major rewrite of the program or can we merely amend those parts of the program which deal with the score table?

A reason often put forward by opponents of structured programming is shortage of space. I recently bought a commercial program that contained what I though was a flaw, so I wrote to the suppliers asking for this flaw to be put right.

Their reply was that there was no room in the program for the additional code but they said that I might be able to patch it myself.

With a challenge like that I had to do something, and so I examined the program carefully and, by using some structured programming techniques, was able to put right the original flaw and take about 300 bytes out of the program.

I suspect that many people are misled by the number of letters used in the program. ENDPROC has seven, while GOTO60 has only six, but it takes at least three bytes of program space as opposed to ENDPROC's one.

Finally, may I suggest that Michael Jackson's book "The Principles of Program Design", which was originally aimed at mainframe programmers, would be much more useful reading than most of the books on machine code.

If the program is designed properly, before a word of Basic, or any other language other than English, is written, much of the dispute about GOTO will cease to be relevant.

As an aside, if Mr Johnson hates BBC Basic so much why did by buy a BBC Micro? – **David H. Wild, Hemel Hempstead, Herts.**

Problems of free-space

*SOME of my programs write data files to disc and incorporate a free-space informer as follows using the *RECOVER Disc Doctor command:*

```
10000 DEFPROCfreespace
10010 *RECOVER 0 1 1 900 0
10020 F%=((((?&906 AND
3)*256)+ ?&907)-(((?&90E
AND 1)*256)+ ?&90F+ ?&90D+
((?&90C>0)*-1))
10030 PRINT''F%" (&";~F%;")
free sectors"
10040 ENDPROC
```

*For non-Doctored users, the *RECOVER command can be replaced with something like:*

```
!&90=&00090000
!&94=&00530300
!&98=&00002101
X%=&90:Y%=0:A%=&7F:CALL
&FFF1
```

However I often run into problems when trying to save a small data file for which there is ample room because the operating system defaults to a file size of 16k.

Is there any way to change this default? – **Ray Watson, Washington, Tyne and Wear.**

● We're afraid we know of no way to change the 16k default.

GCOL – short and sweet

I NOTED with interest the recent number of short programs in your magazine to show the use of the GCOL statement on the BBC Micro.

I must confess to not being graphically minded, but I did manage to put together the following short program using different values for the two parameters of GCOL.

On a monitor the display is obviously better than on a normal domestic set.

```
   10 MODE2:VDU5 :REM Text
at graphics cursor
   20 PROCwr("****************
********",0,1000,3,6,3)
   30 PROCwr("................
........",0,900,0,3,0)
   40 PROCwr("HOWARD BANKS"
,300,800,1,3,0)
   50 PROCwr("PRESENTS FOR
THE",200,700,2,4,0)
   60 PROCwr("B B C",500,60
0,0,2,0)
   70 PROCwr("A COLOURED SC
REEN",175,500,3,5,0)
   80 PROCwr("DISPLAY",500,
400,6,9,0)
   90 PROCwr("................
........",0,300,0,3,0)
  100 PROCwr("****************
********",0,150,2,5,3)
  110 REPEAT UNTIL FALSE
  120 END
  130 DEFPROCwr(A$,A,B,C,D,
E)
  140 FOR X=0 TO 4
  150 MOVEA,B:GCOLE,C:PRINT
A$
  160 A=A-2:B=B+1:C=C+1
  170 IF C=D THEN D=C
  180 NEXT
  190 ENDPROC
```

Not only does it demonstrate the graphics on the Beeb but also the power of the procedure – being able to pass information.

The information passed is the string to be printed, its position on the screen, the GCOL parameters and a count.

– **H. Banks, Bolton, Greater Manchester.**

Japanese English

IF you buy a Shiwana Printer CP-80 you will receive a manual which is pretty well incomprehensible to an Englishman.

Further, if you should write to the suppliers you will find your letter ignored in the best traditions of modern British business methods.

I have struggled through the bit that says "... make it stands as the bottom of the case be vertically face to you ...", and consider that in the circumstances I have done pretty well; but what do I do with "LLIST" on a Beeb?

How do I get the thing to print all those characters shown as part of its repertoire? Can the example programs be translated into "Beeb English"?

Please, is there somebody out there who can make this very versatile machine do what it ought to, or explain in plain English how to cope with, for example, the "bit image mode"?

– **Edmund W. Jupp, Lympstone, Devon.**

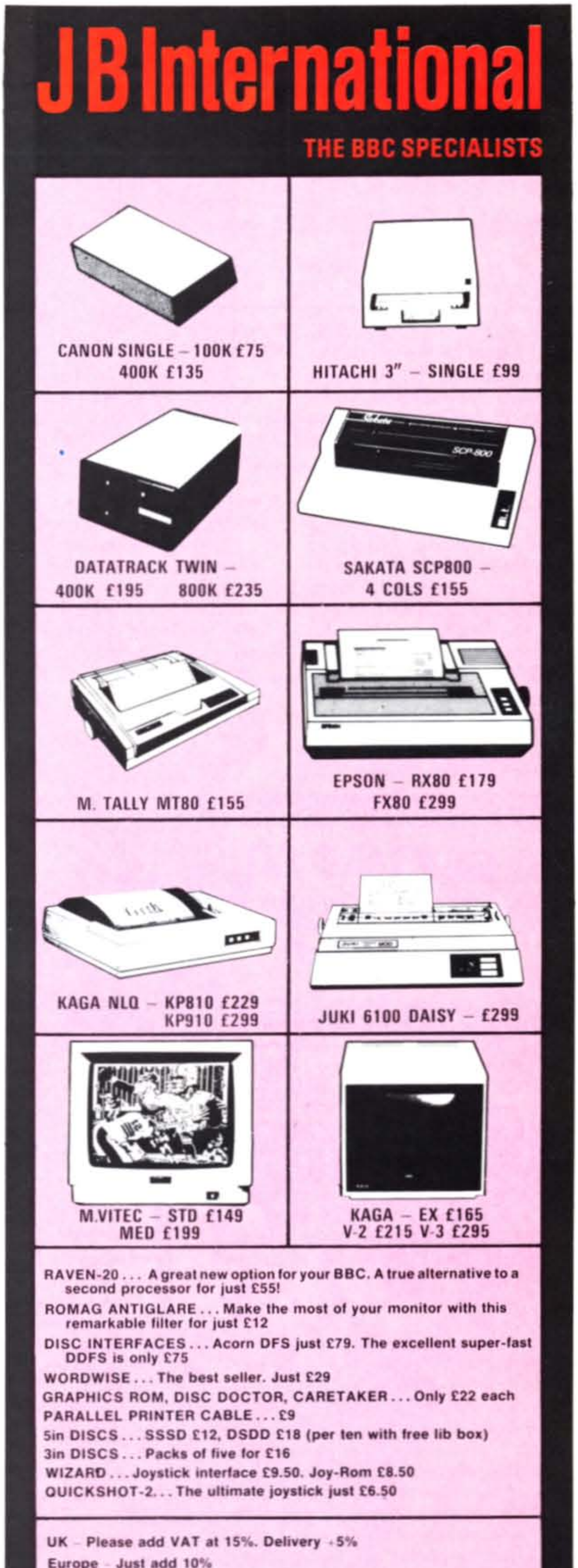
● As far as we can tell, LLIST should be interpreted by the BBC Micro's LIST with the printer turned on with a Ctrl B. Is there any "honourable son" out there can help this gentlemen with the other problems?

The case for a cheaper BBC

I AM the education supplies officer for a local education authority involved in the purchase of micros for use in schools.

I am in no doubt that the authority's decision to purchase the BBC Model B as the

→



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MICROMAIL

From Page 179

standard machine was right in view of the facilities offered.

Moreover, the Government scheme to subsidise the purchase of the schools' first micro was extremely welcome, as it gave British firms the opportunity to establish their products and was most helpful in getting computer studies onto the curriculum.

However, as we draw to the end of this scheme, it appears that with the very high levels of sales achieved, any development and tooling cost incurred in the production of the BBC Micro will have long been recovered and my colleagues and I feel that a substantial price reduction could be made rather than high profits at the expense of the education service.

What I fear most is that Acorn will fall back on their laurels rather than attempting a bold marketing strategy, confident in the fact that now most education authorities have chosen BBC that they will be reluctant to change the standard.

I consider this attitude to be unjustifiable and misguided.

It is apparent that new machines are coming onto the market at regular intervals and sooner or later one will either match or exceed the capabilities of the BBC at a lesser price.

I sincerely hope that both Acorn and the BBC will reconsider their marketing policy and institute measures to offer the Model B at a much more realistic price and, if necessary, adjust production capacity to meet the much greater demand which will inevitably ensue.

Not to do so can only result in the Japanese (MSX and so on) doing to the British computer industry what they did 10 years ago to the car industry. – **M.J. Drinkwater, Cheadle Heath, Stockport.**

Read Kevin, and feel smug

FIRSTLY, thank you for your excellent magazine. Under its influence, I am progressing from total ignorance towards pseudo-concepts. That is, I am beginning to think that I understand some of what goes on when I press these keys.

Recently I delved into the interior to fit a Watford zif sideways ROM socket, and I discovered that my other ROMs have no names on them.

This roused my curiosity and I attempted to get the Beeb to tell all. I have apparently OS 1.20 and Wordwise 1.10, but what Basic?

I've been through The Micro User, the User Guide (surely User's Guide?), The Advanced User Guide (I have delusions of grandeur) and Basic, Sound and Graphics but cannot find a command that will make the Beeb display the Basic version.

REPORT only displays "(c)1982 Acorn".

So, at the risk of asking you to repeat yourselves, how do I find out what version of Basic I have? – and what difference does it make? – **Keith Phillips, Daventry, Northants.**

● The copyright display tells you that you've got Basic II. I suggest you read Kevin Edwards' article in this month's issue and feel smug.

And finally, with tongue firmly in cheek . . .

The Wizard of OS?

Dear Trev,

Would you say that I was a thespian? When you think of me do images of greasepaint and footlights spring into your mind? Of course not, so you can see why I was surprised when Andrea passed on Clive's message:

"The Rogues are trying to raise money for the Save Our Basic I appeal. They've decided to do a pantomime and they want you in on the planning. It's tonight".

"Why me?" I asked as icy fingers clutched my heart, "I know nothing about pantomimes".

"That's not what Clive says", A. replied nastily.

As it was I had no choice. It was A.'s turn to play host to the Romchester Women Bellringers Against The Bomb Consciousness Raising Group. As A. put it, "Men aren't welcome but you can stay if you want".

So that was how I found myself in a smoke-filled room above the public bar of the Ram and Buffer planning a panto. The main problem was which panto to present.

The first suggestion was "Ali Baba And His &28 Thieves". That was vetoed on the grounds that it was too accurate a description of the Rogues for comfort. I did suggest Ali Baba And His Forty Beebs, but that met with even less enthusiasm.

Aladdin was my choice. "We could have Andrea playing the part of Widow Inkey$" I enthused, but they weren't keen.

Even the prospect of a wicked Baron Biriani going round crying "New ROMs for old, new ROMs for old" failed to get them going.

The trouble was that no one else was coming up with an idea, yet they were all looking at me. I later learnt that A. had told them that I was an expert on pantomimes on the sole strength of my having played the beanstalk in primary school.

"What about a musical? We could do the Wizard of OS. Dorothy could have a dog called Goto and she could sing a song called Somewhere, Over The Spectrum".

Groans greeted me. By this time I was getting hysterical. "Could we do Puss in !Boot? We could rope Andrea in on the bells and have them saying 'Repeat Until Whittington'." More groans.

I even suggested Peter Pan with Mike Cook's Real Time Croc, but nobody got it.

In desperation I made my excuses, hurtled down the stairs and phoned Micro User. "We don't take phone calls", was the first thing they said. "But it's me, Wally".

"Don't call me a Wally", came the reply and the line went dead.

"Let me try", said Clive, who'd crept up behind me. He dialled the number. "Would you like a pint?" he said quickly as the phone was picked up at the other end.

"Here", he said, handing me the phone, "you've got their undivided attention".

And they come up with the goods. "Cinderella", they suggested. "You can have Mike Cook playing Cinders, he's just had an accident with his soldering iron. And AMS could supply the mice. Forget about the pumpkin, you could have an Electron turning into a Beeb but it must be back before the six months guarantee runs out".

"Alice could play the fairy godmother while Mike Bibby could be Prince Charming (for a change). Instead of the glass slipper you could find a 6845 CRTC chip".

I must admit that the idea appealed to me. "Fly Buttons, you're undone" has always been one of my favourite lines. "But what about the Ugly Sisters?" I asked, naively.

"Ring Acorn User".

I think they deserve the beer token I'm sending them. Cheers! **Buttons**

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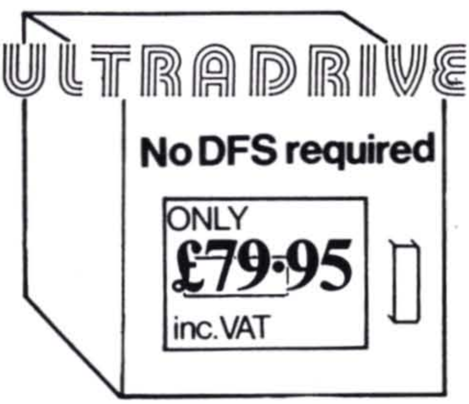

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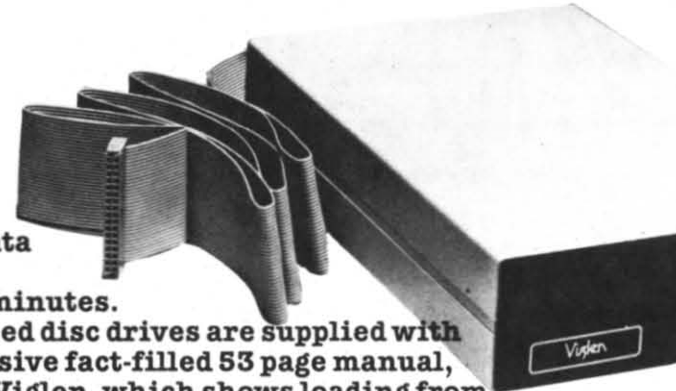

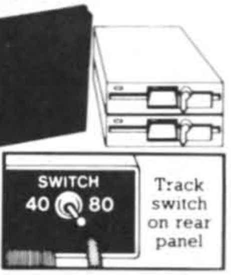

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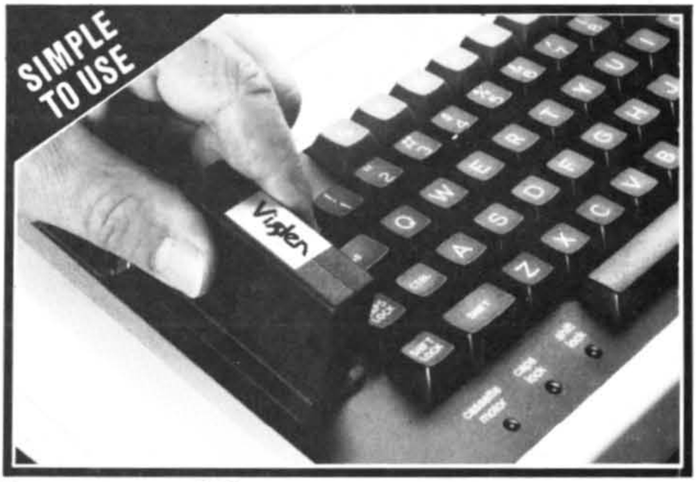

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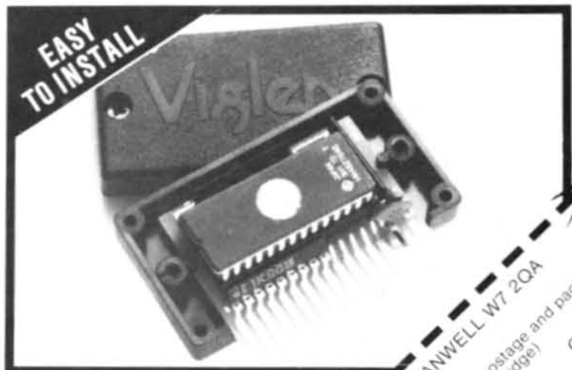

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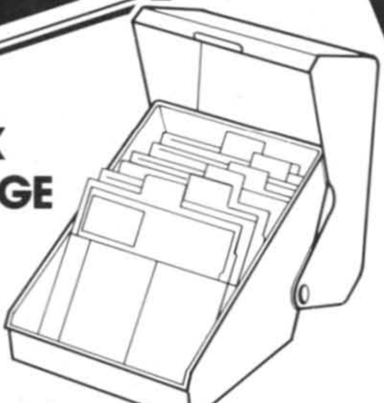

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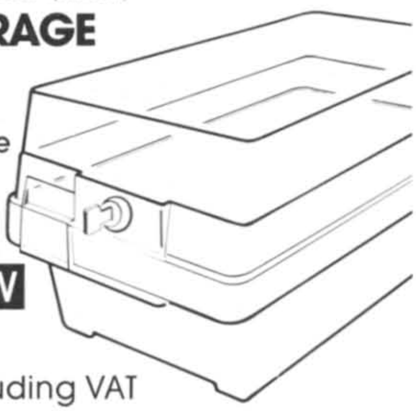

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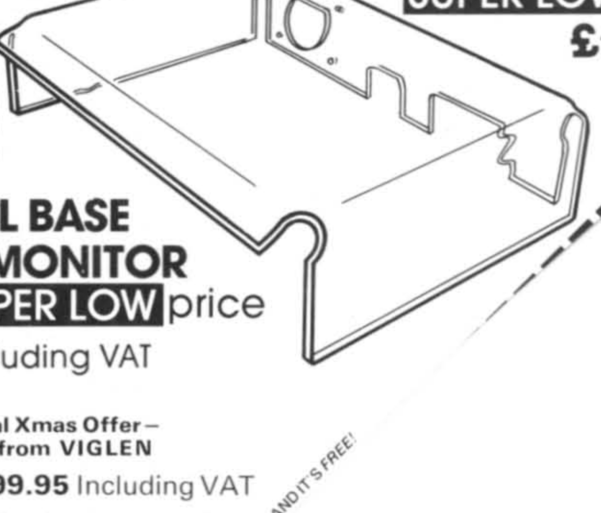

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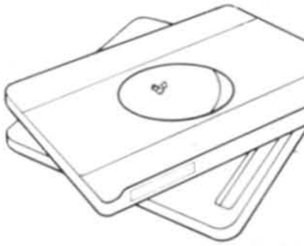

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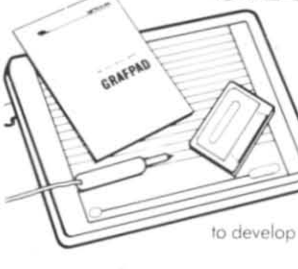

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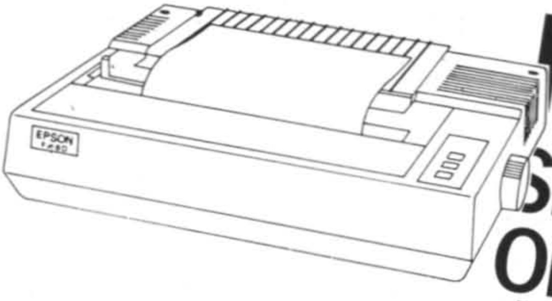

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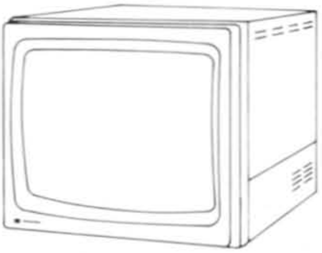

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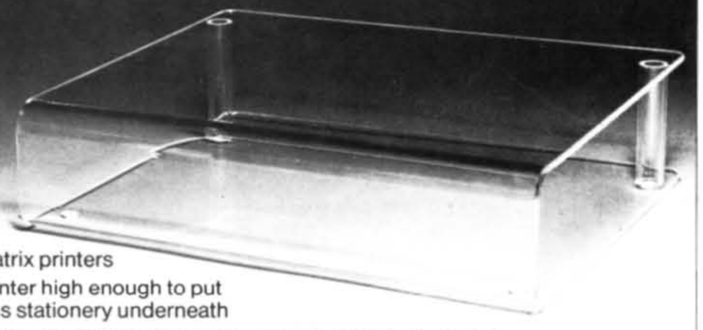

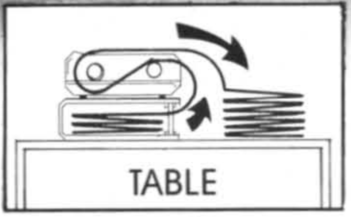

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- Viglen quality every time
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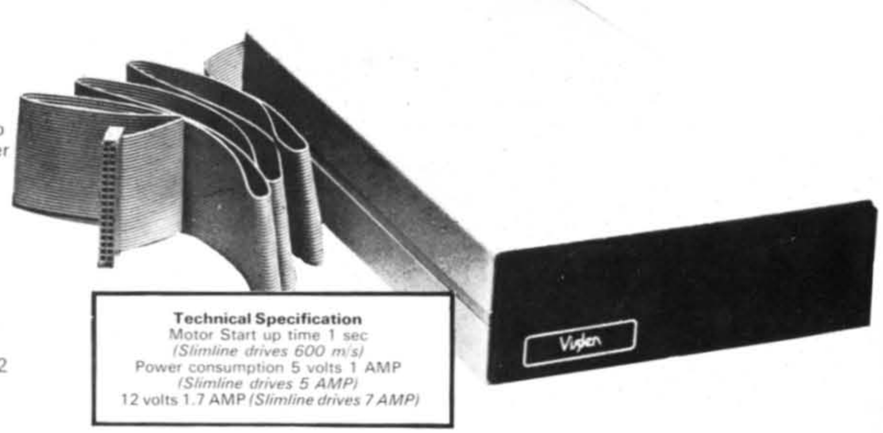

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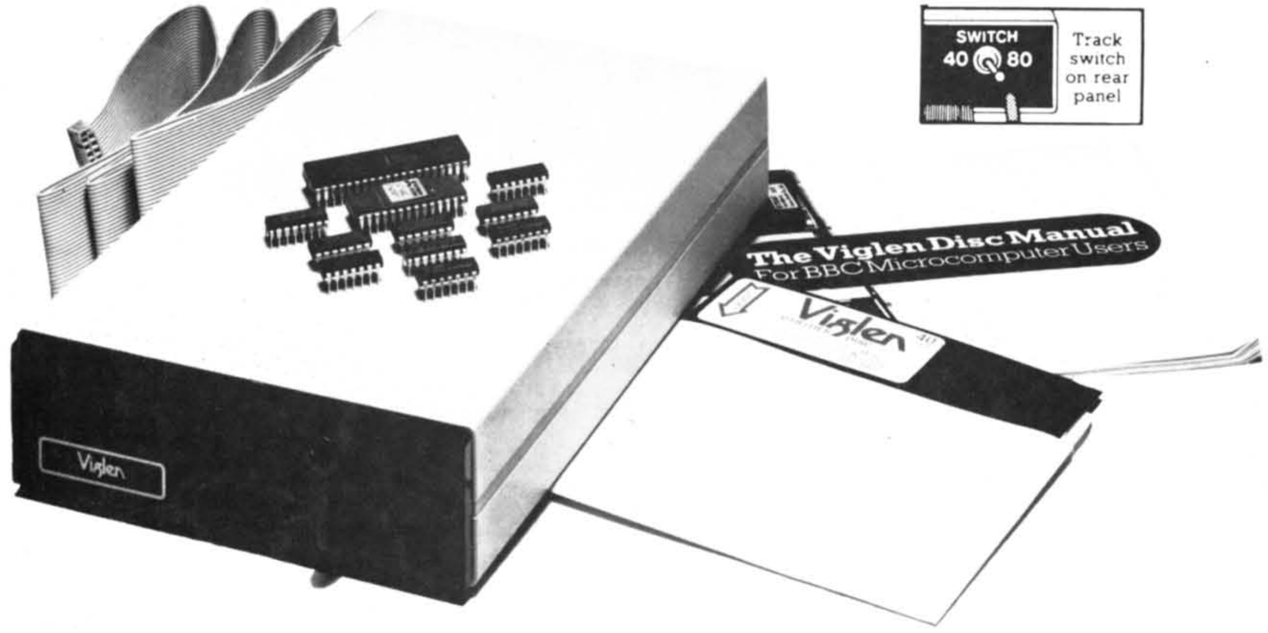
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- Package assumes you own a BBC Model B with switched mode power supply plus 1.2 operating system.

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- Disk Interface (call at factory for free fitting while you wait) or supplied with easy to fit instructions.
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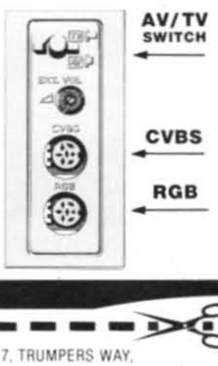

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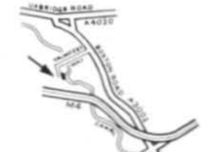

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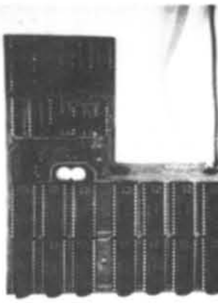
16 SOCKET ROM/RAM EXTENSION BOARD



Fully buffered the board offers the following features:

All 16 sockets may contain 8K or 16K roms.

Up to two pairs of sockets may be configured to accept 8K eproms to simulate a 16K eprom without the expense of a 27128.

Up to 16K of CMOS RAM type 6116LP (made up of 8 2K ram chips) may be fitted to 8 of the available sockets leaving 8 free for roms.

or 2 8K Ram chips (6264) leaving 14 available sockets.

The advantage of sideways ram is twofold:

1. Programs can be assembled directly to hex 8000 and debugged before being committed to eprom.
2. Programs intended for sideways roms may be stored on disc and downloaded into ram. Many more programs may be kept on disc allowing the extension board to be fitted only with roms that need to be resident.

This is a high quality PTH board and plugs into the extreme right hand rom socket.

4 wires to the paging register and one lead to the R/W line have to be connected.

Separate power leads for the board

are used to eliminate possible crashes that may occur due to trying to draw up to 650mA from a sideways rom socket.

Board fully assembled and tested complete with full installation and operating instructions.

Cost £34.50 + VAT, £1.00 P&P

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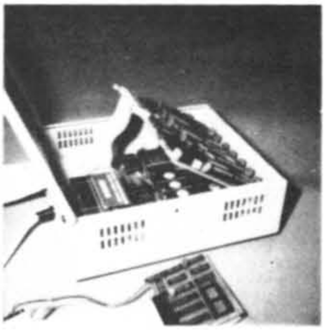
THE NEW EXTERNAL 28 ROM EXPANSION SYSTEM FROM HCR ELECTRONICS



This extremely powerful but versatile machine has the capability of: 32K RAM & 24 sockets available for ROM *or* many various combinations to your personal requirements.

This machine has its own separate power supply which eliminates drain on the BBC's switched mode supply.

NO SOLDERING IS REQUIRED.

The unit consists of two modules:

1. An adaptor board to plug into the BBC sidways Rom socket 15.
2. The expansion case.

The case comes complete with an inbuilt power supply and one expansion card. This card will hold 12 Roms or a combination of Ram/Rom (Ram can be 6116's, 2016's or 6264's). This gives a total of 16 Roms (including four in machine).

A second board identical to the above can be fitted at a later date, giving a total capability of 28 available sockets for Rom or Ram.

The second board can be selected as an alternative to the first board, either by a switch on the case *or* via software control.

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1. No soldering required.
2. No access into machine required after initial fitting.
3. No overheating problems.
4. Does not physically interfere with other internal expansion add-ons.
5. Built in power supply (does not overload BBC's supply).
6. Computer will still function with external box powered down or unplugged (using Roms resident in machine).
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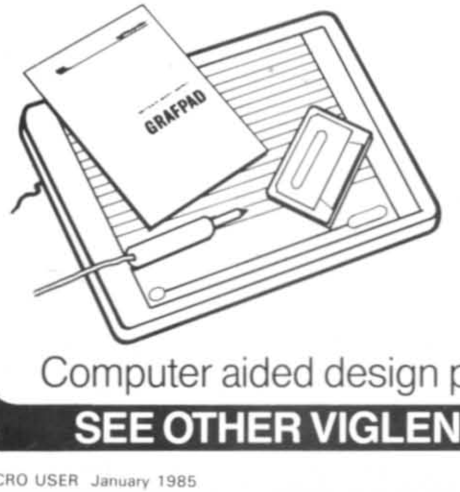

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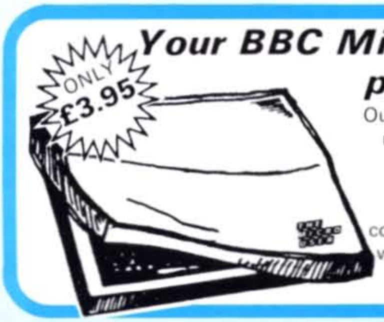

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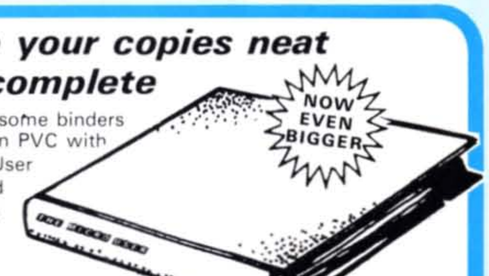

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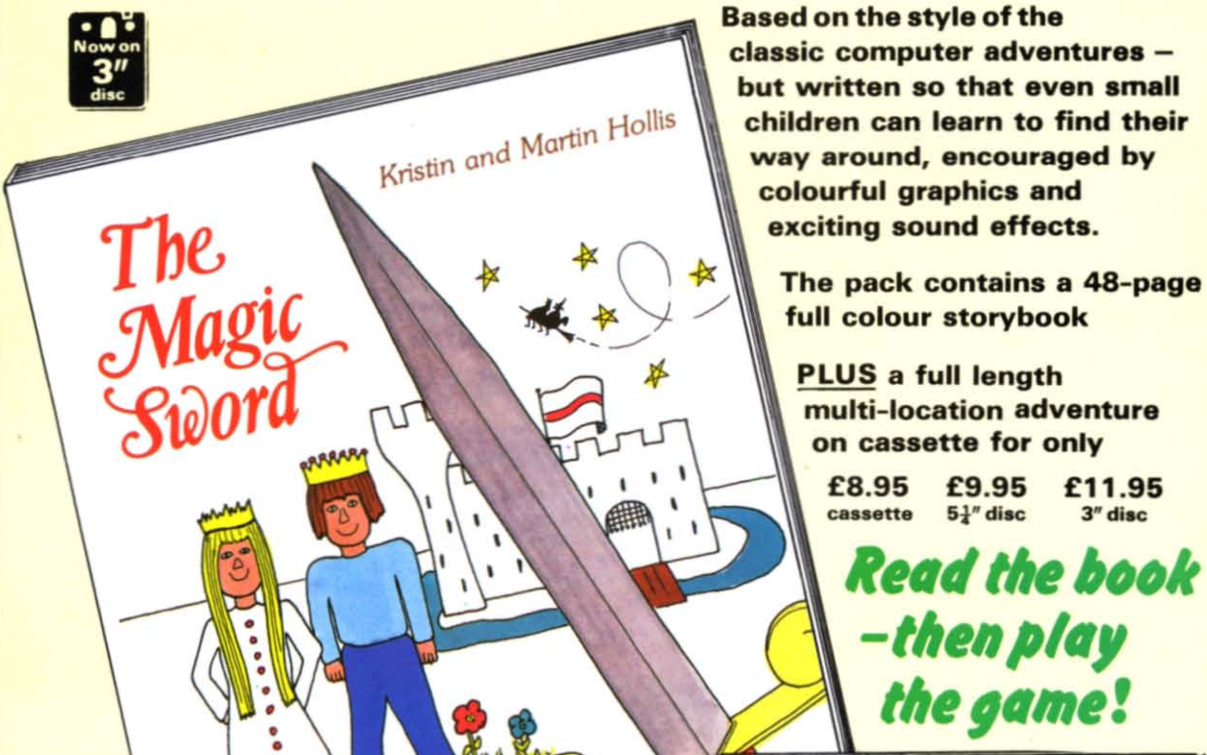
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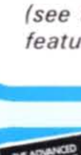

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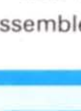

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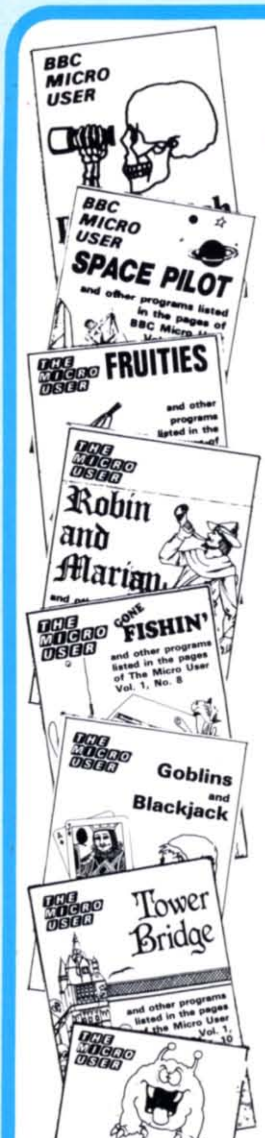
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MARCH 1983: Deathwatch, a superb arcade game **Bingo,** clever uses of the randomise function; **Bubblesort** routines; **Tests** function keys in machine code. 0.1 **Colour** and **Graphics Routines:** create a kaleidoscope of screen designs.

APRIL: King Kong, rescue girls from the Empire State Building before killing Kong. **Nim,** a structural game of strategy. **Tokens,** unravel the Basic ROM; **Formatter,** an essential disc utility; **Disassem,** a full machine code disassembler.

MAY: Air Strike, a fast and furious arcade game; Test your mental powers with **Pelmanism; Anagrams,** the word game. **Character,** generate vertical and inverted text. **Teletext,** animation in Mode 7. **Beeb,** two joystick exercises.

JUNE: Space Pilot, lost in space you must fight off repeated attacks from alien life forms. **Nomism,** you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. **Colourful Characters Plus** other listings from the June issue.

JULY: Tenpin, a simulation of Tenpin Bowling; **Spacepods,** beat the alien hordes; **Cup,** exciting 3D graphics techniques **Test** and **Steady,** programs to accompany the Beeb Body Building Course. **Breakfix,** don't let Break destroy your precious variables!

AUGUST: Fruities, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. **Animation,** a suite of programs that really bring your screen alive; **Casdisc,** the machine code downloader for your disc system; **Mode 7** colour routines.

SEPTEMBER: Robin & Marian, rescue Maid Marian from the Sheriff of Nottingham. **Galactic Invaders,** an exciting arcade game. **DFS Benchmarks,** 14 DFS test programs. **Animation,** new techniques. **Terminal,** connect a BBC Micro to a mainframe.

OCTOBER: Fishing, a compulsive day's angling. **Joykey,** convert programs to joystick. **Pentest** and **Bellringer,** for Micro User lightpens. **Contours,** an educational program. **Link** BBC Micros to each other. **Plus** all the listings from the first Electron User.

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NOVEMBER: Goblins, an enchanted journey. **Blackjack,** the casino favourite. **Charge** and **Pendulum,** Body Building Course part 9. **Sideways,** programs in ROMs. **Pendraw,** a light pen sketching program. **Plus** all the programs from the second Electron User.

DECEMBER: Tower, rescue London's treasure. **Santa,** help Father Christmas. **VDU 23,** an invaluable character defining utility. **Paged,** graphic techniques. **Plus** all the listings from the third issue of Electron User.

JANUARY 1984: Barrels, an all-action arcade game. **Noteplay,** an entertaining musical utility. **Dump1** and **Dump2,** multitone screen dumps. All the programs from our **Sound, Beginners'** and **Graphics** articles **Plus** 12 programs from the fourth Electron User.

FEBRUARY: Invasion, the classic arcade game. **Frogs,** fun for all the family. **Engvgen,** a logic game. **Balance,** a number learning program. **Key,** single key entry for the BBC Micro **Plus** nine other programs from *The Micro User.*

MARCH: Mazemunch, blockbusting arcade action. **Birthday,** family fun for our anniversary. **Derrick,** number fun for infants. **Pixelpen,** high resolution for lightpens.

APRIL: Microgolf, the simulation. **Eastermaze** and **April Fool,** seasonal games. **Seawall** and **Magic Square,** maths fun. **Filer** and **Album,** a database of sounds. **TRX1, TRX2,** RS423 driver. **Heartrate,** monitor your fitness.

MAY: Dug Dig, asteroid adventures. **Damraider,** naval action. **Envaid,** easy envelopes. **Steppers,** Body Building motor control. **Spiro,** graphics windows. **Adventure,** a trapdoor maze. **Renumber,** program utility. **Bigletter,** large type. **Memory,** RAM efficiency.

JUNE: Roadracer, 3D driving action. **Quadline,** four-in-a-line logic game. **Monitor,** machine code debugging routines. **Toolkit** 8271 disc controller explored. **Areas,** easy maths. **Spell,** spelling education.

JULY: Doomrun, deep space drama. **Backgammon,** the classic board game. **Keys,** user defined key editor. **Save?** and **Tidisk,** disc utilities. **Alice1** and **Alice2,** mini-adventures. **Terminal1** and **Terminal2,** two communication programs. **Acoustic,** software for the Body Build Modem.

AUGUST: Castle, an enthralling adventure program. **Gridman,** a high speed game of strategy. **Tedit,** a superb Teletext editor. **Dsquare,** simple number fun. **Dedit,** a versatile disc editor. **Input,** the ultimate general input routine. **Bells,** Alice's mini-adventure.

SEPTEMBER: Villains, save your crystals from the evil onslaught. **Rollerball,** an intriguing game of strategy and agility. **Microterm,** comms terminal. **T/Textdump,** Mode 7 screen dump. **Numbersign,** simple number skills test for infants.

OCTOBER: Wampus, explore the labyrinth and slay the beast. **Balloon,** brave the caves, escape the Goulogs. **Splits,** split screen utility. **Pageram,** paged RAM programs. **Input1/2,** alternative inputs for the disabled. **Morecol,** extended colours. **D/A,** a waveform generator. **Integer,** direct addressing speed.

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JANUARY: Rover, guide our retriever to his rations. **Backgammon,** an exciting two player version. **Matchwood,** shape recognition for infants. **Messages,** machine code printing. **Speedtext,** display text at different rates. **Search,** a powerful programming tool. **Second processor,** Body Building and graphics routines. ***Plus Galactic Tycoon, our superb free game.***

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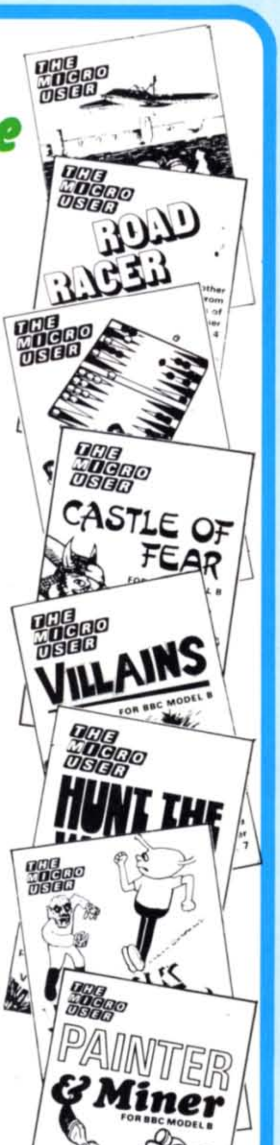
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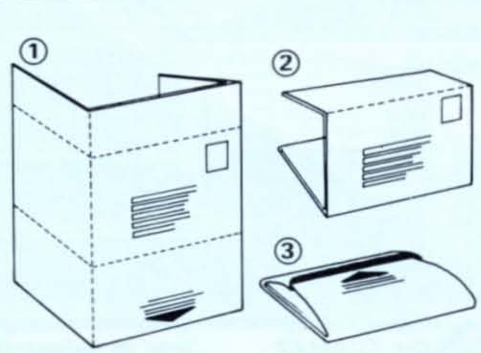

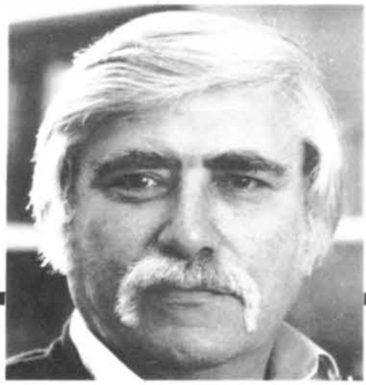

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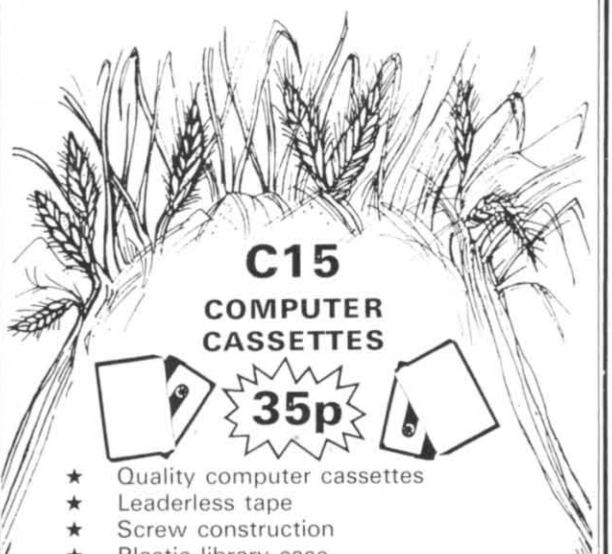

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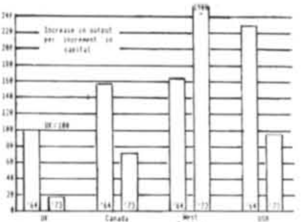

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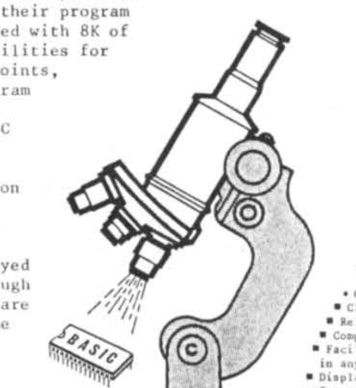

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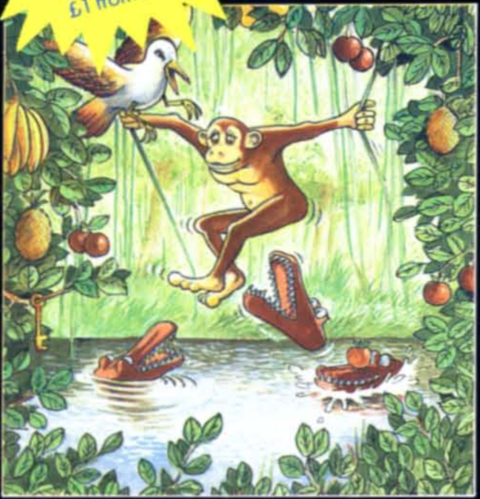

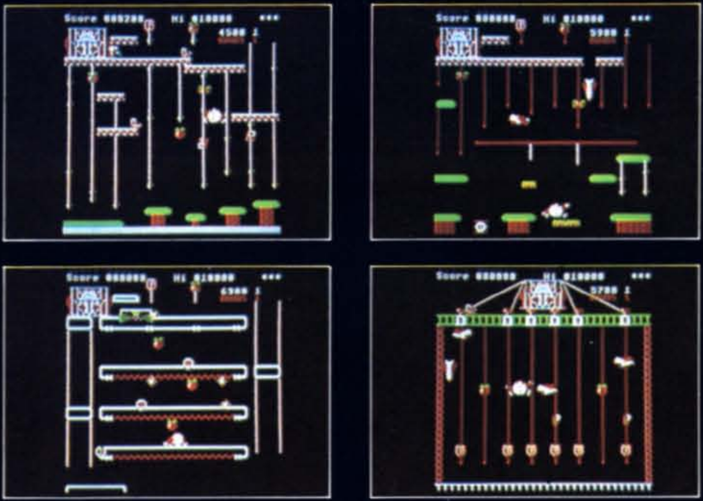

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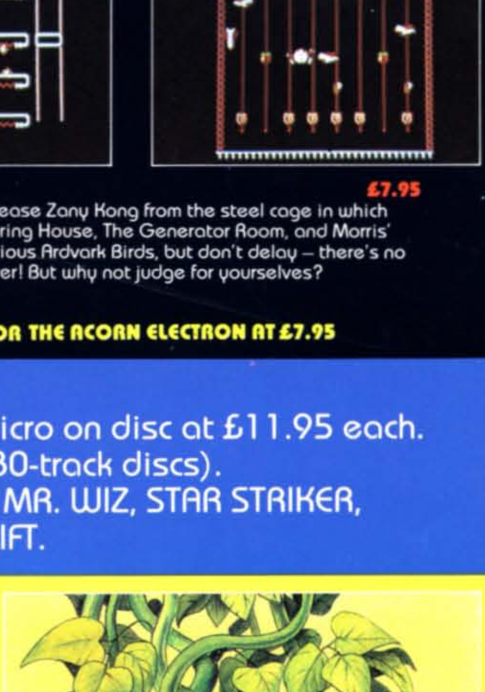

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